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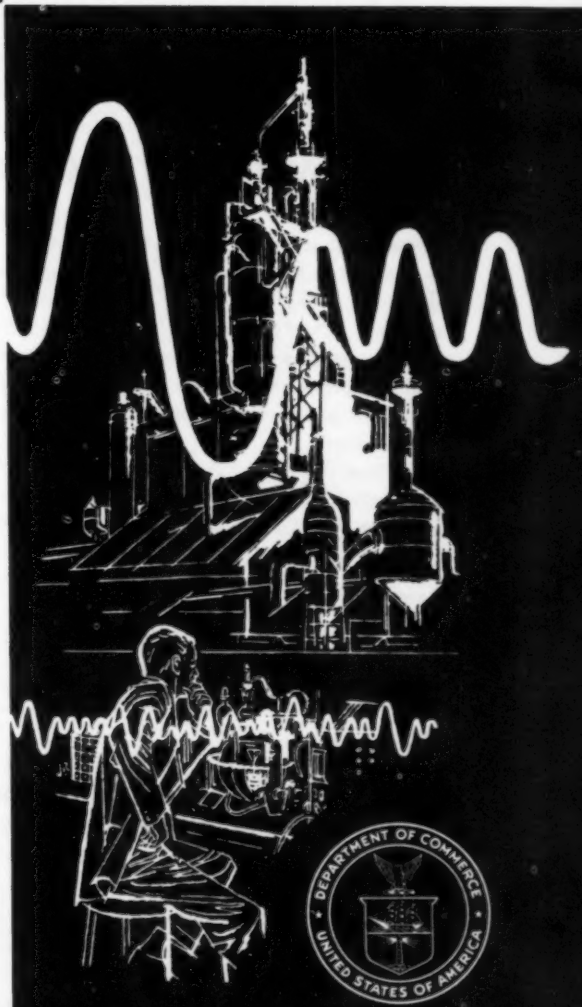

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U.S. DEPARTMENT OF COMMERCE **OFFICE OF TECHNICAL SERVICES**

Luther H. Hodges, Secretary

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INEXPENSIVE, MANUALLY OPERATED PUMPS SUITED FOR HANDLING VARIOUS LIQUID WASTES IN FALLOUT SHELTERS.
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*WEATHER FORECASTING
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*WELDING
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*WINGS
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WING TRAILING-EDGE CONTROL SURFACE OF TZM MOLYBDENUM.
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PREPARATION AND EVALUATION OF ZONE-REFINED SINGLE-CRYSTAL AND POLYCRYSTALLINE BERYLLIUM AND BERYLLIUM-COPPER ALLOYS.
AD-403 787 DIV. 17

TECHNICAL ABSTRACT BULLETIN

1. AIRCRAFT AND FLIGHT EQUIPMENT

AD-403 507 Div. 1, 9, 17
(TISTA/LSK) OTS price $2.50

Bolt Beranek and Newman, Inc., Cambridge, Mass.
STUDY OF A RESPONSE LOAD RECORDER. VOLUME II.
Final rept. Jan-Aug 62,
by P. W. Smith, Jr., E. A. Starr, C. W. Dietrich and D. U. Noiseux. Mar 63, 105p.
Contract AF33 616 7789, Proj. 1370, Task 137005
ASD TDR62 165, vol. 2

Unclassified report

Report on Dynamic Problems in Flight Vehicles.

Descriptors: *Sonic fatigue, Structures, Air frames, Acoustic properties, Dynamics, Airborne, Resonance, Strain gages, Noise analyzers, Loading (Mechanics), Noise, Jet engine noise, Fatigue (Mechanics), Transducers, Electroacoustic transducers, Mathematical prediction, Recording systems.

A compact instrument to measure the strain history of a point on a resonant structure of a flight vehicle is considered. The output data from the instrument is designed to aid in the estimation of acoustic fatigue damage. The ability of a strain gage to perform under fatigue conditions is examined. The design of circuitry to modify the sonic recorder discussed in Volume I (AD-295 464) to a response recorder are discussed. Performance data of the breadboarded response recorder, tested with a resonant structure, are given. (Author)

AD-403 663 Div. 1
(TISTP/JEA) OTS price $5.60

National Aviation Facilities Experimental Center, Atlantic City, N. J.
EVALUATION OF AN OMNIDIRECTIONAL INTERROGATING METRIC WAVE PILOT WARNING INSTRUMENT.
Final rept.
by Karl H. Burkard and Bernhart V. Dinerman.
Feb 63, 46p.
Proj. 110 505V

Unclassified report

Descriptors: *Flight instruments, *Early warning systems, *Aircraft, Direction finding, Position finding, Hazards, Flight testing, Multiple operation, Radar navigation, Radar antennas, Display systems, Data processing systems, Coding, Direction finding signals, Attitude indicators.

The evaluation of a (PWI) pilot warning instrument is described. The equipment was intended to be a low-cost, lightweight, all-weather PWI and utilized an omnidirectional interrogating metric wave technique. Laboratory tests to determine the altitude discrimination capability of the PWI were performed. Field tests to determine the PWI bearing accuracy were conducted, and ground-to-air and air-to-air evaluations to determine the PWI range accuracy, reliable communication range and effects of interference on PWI performance were conducted in two specially instrumented C-45 type aircraft. Data acquired from these tests were reduced, correlated, and analyzed to determine the adequacy of the PWI technique for the development of a low-cost, lightweight, all-weather Pilot Warning Instrument for the aviation community. (Author)

AD-404 223 Div. 1
(TISTA/LSK) OTS price $4.60

Tactical Air Command, Langley Air Force Base, Va.
OPERATIONAL TEST AND EVALUATION AIR REFUELING F-100 D/F WITH KC-135.
Dec 62, 1v.
TAC TR62 61

Unclassified report

Descriptors: *Jet fighters, Tanker planes, Flight paths, Afterburners, Jet transport planes, Feasibility studies, Flight testing, Refueling-in-flight.

Air-to-air refueling with the F-100 D/F aircraft from a KC-135 tanker without the use of afterburner had not previously been explored with 335-gallon drop tanks. The 31st Tactical Fighter Wing and the 407th Refueling Squadron from Homestead AFB, Fla., were tasked to fly 16 tactical fighter sorties and 4 tanker sorties, respectively, to gather data in order to determine the optimum altitude for refueling without the use of afterburners. (Author)

AD-404 420 Div. 1
(TISTA/LSK) OTS price $21.00

Douglas Aircraft Co., Inc., Long Beach, Calif.
LANDING LOADS INVESTIGATION INSTRUMENTATION,
by H. D. Meriwether and I. E. Harris. 26 Oct 62, 1v. ES40636
Contract NOas59 6226

Unclassified report

Descriptors: *Attack bombers, *Jet bombers, *Airplane landings, Naval aircraft, Load distribution, Measurement, Tables, Shock resistance, Instrumentation, Data, Landing impact.

Loads and contact conditions were measured during landings of an A4D-2 airplane. Instrumentation was installed in the airplane and landings were performed at the Naval Air Test Center, Patuxent River, Maryland under specific contact conditions. Upon completion of these landings, the instrumentation was removed from the airplane and shipped to the Douglas Aircraft Company facility at El Segundo, California for a series of laboratory drop tests with an A4D-2 static test airplane. This report discusses the instrumentation installed in both the flight and drop test airplanes and also the supporting instrumentation used during the flight and drop tests. (Author)

Division 1 - AIRCRAFT AND FLIGHT EQUIPMENT

AD-404 462 Div. 1
(TISTA/LSK) OTS price $6.60

Martin-Marietta Corp., Orlando, Fla.
RECIRCULATION PRINCIPLE FOR GROUND EFFECT MACHINE MAN-CARRYING TEST VEHICLE. PRELIMINARY FLIGHT TEST RESULTS.
Final rept., Mar-June 62.
Dec 62, 57p. OR2830
Contract DA44 177TC710 Task 1D021701A04804
ATREC TR62 100

Unclassified report

Descriptors: *Ground effect machines, Bleed systems, Hovering, Duct bends, Gas turbines, Flight testing, Gas flow.

Results are presented of a preliminary experimental evaluation of a recirculation ground effect machine conducted by the Martin Company. The GEM vehicle tested was of rectangular planform type with base dimensions of 12 feet by 15 feet. Lift power was supplied by two AiResearch GTC 85 series bleed air jet engines. Since the vehicle was intended primarily as a hovering test bed, forward propulsion was not specifically provided. The vehicle was evaluated with respect to lift capability, static stability, and control effectiveness. Dust and spray characteristics were observed over land and water respectively. (Author)

AD-404 489 Div. 1, 30
(TISTA/LSK) OTS price $9.10

Douglas Aircraft Co. Inc., Long Beach, Calif.
LANDING LOADS INVESTIGATION LABORATORY DROP TESTS,
by F. C. Allen, H. D. Meriwether and L. B. Mosby.
Sep 62, 98p. ES40641
Contract NOas 59 6226

Unclassified report

Descriptors: *Attack bombers, *Jet bombers, *Airplane landings, Naval aircraft, Load distribution, Measurement, Tables, Shock resistance, Instrumentation, Data, Airplane landings, Landing impact.

Airplane drop tests were conducted as part of an extensive program to compare the landing loads experienced by an A4D-2 airplane during flight tests and drop tests with those computed by analytical methods. The instrumentation used in these tests was nearly identical to that used in the flight test program and was sufficient to determine the loads applied to the airplane at the ground, the position of the strut, the internal pressures in the gear and significant structural accelerations. The results are presented in the form of curves of measured parameter versus time. Vertical and horizontal loads on the gear at the ground were computed from the strut instrumentation and are compared with data from the reaction platforms. Two recommendations pertaining to the need for further work arise from this drop test program. The first is that a study of the dynamic characteristics of the reaction platforms be made in order that confidence in the strut instrumentation can be improved, and second, that a sliding coefficient of friction test be made of the tire on the reaction platform surface for the purpose of substantiating the high coefficients of friction registered by the left-hand strut. (Author)

AD-404 490 Div. 1
(TISTA/LSK) OTS price $15.00

Douglas Aircraft Co., Inc., Long Beach, Calif.
FLIGHT TEST MEASUREMENT OF LANDING LOADS ON THE A4D-2 AIRPLANE,
by I. E. Harris and S. F. Tydeman. 7 Dec 62, 1v. DEV3616
Contract NOas59 6226

Unclassified report

Descriptors: *Attack bombers, *Jet bombers, *Airplane landings, Naval aircraft, Load distribution, Measurement, Tables, Shock resistance, Instrumentation, Data, Landing impact.

A Flight Test program was conducted to obtain landing-gear loads and airplane responses associated with field landings under controlled conditions. A total of 209 landings was made with a Model A4D-2 airplane during the period from 8 September 1960 to 2 November 1960 to obtain 29 landings satisfying the desired touchdown conditions. Landings were made at two values of sink speed at each of two different approach speeds on two types of runway surface, dry concrete and concrete coated with approximately one-eighth inch of non-skid deck compound. Landings were also completed at three sink speeds with external fuel tanks installed on the wing pylons. Additional landings were made to obtain unsymmetrical touchdown conditions and others were made to run over a cross-deck pendant with the tires bottomed. Data are presented in this report in the report in the form of time-history plots for 26 satisfactory landings, since calibration data were found to be invalid for the early landings. The data from the 26 landings were used by the Douglas Aircraft Company to compare with predicted loads (analysis) and drop test loads obtained with the identical instrumentation. (Author)

AD-404 501 Div. 1, 5
(TISTE/JBM) OTS price $2.60

RCA Defense Electronic Products, Burlington, Mass.
STUDY REPORT FOR THE INTEGRATION OF DIGITAL DATA COMMUNICATIONS SET AN/ASW-21 INTO THE F8U-2N/2NE, A3D-2/2P/2Q, A4D-2/2N/5, A3J-1, AND A2F-1 AIRCRAFT (ADDENDUM).
28 Mar 63, 26p.
Contract NOw61 0918

Unclassified report

Addendum to AD-328 661L.

Descriptors: *Data transmission systems, *Communication systems, Digital systems, Jet fighters, Naval aircraft, Attack bombers, Jet bombers, P band, Very high frequency, Ultra high frequency, Transmitter-receiver, Frequency shift keyers, Digital-to-analog converters, Ground support equipment, Test sets, Power supplies, Maintenance equipment, Control systems, Computers, Data processing systems, Airborne.

A study is presented of the integration of the digital data communications set AN/ASW-21 into the F8U-2N/2NE, A3D-2/2P/2Q, A4D-2/2N/5, A3J-1 and A2F-1 Aircraft. The AN/ASW-21 is a universal Data Link equipment which is designed for use with a wide variety of Navy aircraft. The AN/ASW-21 can be integrated into each aircraft with special mating equipments in the form of data processing, display, and autopilot coupling units, which will be provided by the aircraft manufacturers. The digital data communications set, AN/ASW-21, consists of a converter, digital-to-digital/analog, CV-1292/ASW-21, a computer, aircraft control, CP-671/ASW-21, and a control, data communications set, C-4085/ASW-21. (Author)

AD-404 509 Div. 1, 30
(TISTA/LSK) OTS price $6.60

Douglas Aircraft Co., Inc., Long Beach, Calif.
LOADS EXPERIENCED BY THE A4D-2 AIRPLANE DURING LANDINGS WITH EXTERNAL STORES, DURING LANDINGS ON AN ARRESTING CABLE AND DURING UNSYMMETRICAL LANDINGS.
Final rept.
Nov 62, 54p. LB31074
Contract NOas59 6226

Unclassified report

Descriptors: *Attack bombers, *Jet bombers, *Airplane landings, Naval aircraft, Load distribution, Measurement, Tables, Shock resistance, Instrumentation, External stores, Arresting gear, Data, Landing impact.

Data are presented showing the loads developed during actual landings of the A4D-2 airplane with external stores mounted on the wing, during unsymmetrical landings and during landings in which the gear traversed an arresting cable. Results of a dynamic analysis are compared with the loads experienced during the external store landings only. The correlation of analysis and theory was not considered satisfactory insofar as the external store accelerations were concerned. Recommendations for improving and extending the analytical work are presented. (Author)

AD-404 510 Div. 1, 30
(TISTA/LSK) OTS price $9.60

Douglas Aircraft Co., Inc., Long Beach, Calif.
AN INVESTIGATION OF THE LANDING LOADS EXPERIENCED BY THE A4D-2 AIRPLANE DURING FLIGHT TESTS AND DROP TESTS AND A COMPARISON WITH THEORY.
Final rept.
Oct 62, 109p. LB31038
Contract NOas59 6226

Unclassified report

Descriptors: *Attack bombers, *Jet bombers, *Airplane landings, Naval aircraft, Load distribution, Measurement, Tables, Shock resistance, Instrumentation, Theory, Mathematical analysis, Mathematical prediction, Data, Landing impact.

An investigation was conducted for the purpose of evaluating the adequacy of simulating landing loads by airplane laboratory drop tests and for the purpose of determining the accuracy with which these loads may be calculated by means of a dynamic analysis. Curves are presented which compare ground loads obtained from airplane landings, airplane drops, and theoretical analyses. The computing program for the theoretical analysis and its required input data are described. (Author)

AD-404 560 Div. 1, 5, 8, 19, 33
(TISTE/OHD) OTS price $9.60

Hazeltine Technical Development Center, Inc., Indianapolis, Ind.
SMALL, LIGHT-WEIGHT ALTITUDE TRANSMISSION EQUIPMENT.
Final rept.
Apr 63, 1v.
Contract ARDS477, Proj. 108 28 1D

Unclassified report

Descriptors: *Telemeter systems, *Transponders, *Radio equipment, *Aircraft equipment, Identification systems, L band, Coding, Transistor amplifiers, Transducers, Radiofrequency oscillators, Altimeters, Air traffic control systems.

Both SLATE I and SLATE II operate at a transmitter frequency of 1090mc and receiver frequency of 1030mc. SLATE I reply codes include any of 33 altitude codes plus an IDENT pulse. SLATE II reply codes include any one of 33 altitude codes in mode c or codes 00 through 77 (64 codes), plus the IDENT pulse in mode 3A. Both SLATE modes incorporate additional circuits to provide echo suppression and side lobe suppression. Major problem areas were encountered in the development of an adequate, low-cost altitude transducer, and in the development of the transmitter oscillator. A pressure cell-controlled servo system was adopted as an altitude transducer. An adequate transmitter oscillator was developed using a miniature triode. Other development problems concerning pulse width variation and receiver sensitivity and selectivity were surmounted. In conclusion, all specified performance characteristics were met or exceeded. The equipment size could be reduced by using miniature components. The increased cost, however, would offset the weight and space savings incurred. (Author)

AD-404 562 Div. 1
(TISTP/JEA) OTS price $4.60

Federal Aviation Agency, Washington, D. C.
COMMERCIAL SUPERSONIC TRANSPORT AIRCRAFT RESEARCH PROGRAM. SELECTED REFERENCES.
Apr 63, 38p.
FAA BL8

Unclassified report

Descriptors: *Transport planes, *Supersonic planes, *Airframes, *Flight control systems, *Bibliographies, Jet engines, Sonic boom, Simulation, Lubrication, Jet engine fuels, Materials, Dynamics, Metals, Jet propulsion, Aircraft, Structural properties.

AD-404 586 Div. 1, 19
(TISTE/JWS) OTS price $3.60

Tactical Air Command, Langley Air Force Base, Va.
OPERATIONAL TEST AND EVALUATION DOPPLER NAVIGATION SYSTEM FOR F-100 (RYANAV IV DOPPLER).
May 63, 1v.
TAC TR62 24

Unclassified report

Descriptors: *Doppler navigation, *Jet fighters, Errors, Ground speed, Drift, Continuous wave radar, K-band, Altimeters, Tests, Computers.

The capability of a prototype RYANAV IV Doppler Radar to provide accurate inputs to the AN/ASN-25 Computer and the BANDS Pictorial Display was evaluated at Nellis Air Force Base, Nevada, during the period 1 August 1962 to 1 February 1963. The system was installed in an F-100F aircraft with the doppler radar mounted in an external fuel tank. The RYANAV IV Doppler Radar was very accurate but the full potential of the system is limited by the inaccurate heading reference system presently installed in the F-100 aircraft. The altitude and attitude capability of the system is more than adequate for normal tactical fighter navigational maneuvering. A navigation system having performance characteristics of the type tested would greatly improve the operational capability of tactical strike aircraft, particularly in marginal weather or at night. (Author)

2. ASTRONOMY, GEOPHYSICS AND GEOGRAPHY

AD-403 506 Div. 2
(TISTP/MFA) OTS price $2.60

Stanford Research Inst., Menlo Park, Calif.
OBJECTIVE AND DYNAMICAL STUDIES OF TROPICAL WEATHER PHENOMENA.
Quarterly progress rept. no. 3, 1 Dec 62-28 Feb 63,
by R. L. Mancuso and R. W. Endlich. 28 Feb 63, 14p.
Contract DA36 039sc89092, Proj. 3A99 27 025 09 00
Unclassified report

Descriptors: *Meteorological phenomena, *Meteorology, Meteorological parameters, Weather forecasting, Meteorological charts, Wind, Humidity, Atmospheric precipitation, Atmospheric motion, Clouds, Turbulence, Vortices, Tropical regions, Analysis.

Analyses of objectively computed layer quantities (relative humidity, stream function, divergence, etc.) for the period 5-8 May 1959 were completed. The degree of persistence of the stream function was investigated and found to be considerably greater than that of heights during this period. The stream function fields were also compared with subjective wind-contour charts. The vertical motion and humidity fields were compared with surface reports of clouds and precipitation, and were found to be in reasonably good agreement. The limited coverage provided by surface reports is a definite handicap to such comparisons, and indicates that further evaluations should be made with satellite data. Investigation of the influence of scale (size of computational triangles) on computed values of divergence and vorticity revealed that magnitude decreased, on the average, about one-half, as area increased from 2 x 10 to the 4th power to 4 x 10 to the 5th power sq. cm. Beyond this size, average magnitudes remained constant in an unrealistic fashion. Thus it appears that an upper limit of size is approximately 4 x 10 to the 5th power sq. km, for computations of this type. (Author)

AD-403 509 Div. 2
(TISTP/WH) OTS price $1.10

Air Weather Service, Scott Air Force Base, Ill.
FORECASTING BLOWING DUST AT GEORGE AFB, CALIFORNIA,
by Kenneth W. Bickett. Mar 63, 8p.
Unclassified report

Descriptors: *Weather forecasting, *Dust storms, *Visibility, *Wind, Velocity.

The main factors in causing blowing dust at George AFB are the combination of steady wind speed and gusts, with steady wind speed as the main factor. When the steady wind speed reaches its critical value the loose dust lying on the desert floor will be lifted to a height sufficient to restrict the visibility. These values are, 17 knots for a Northerly wind, 26 knots for a Southerly wind, and 25 knots for a Westerly wind. The critical value increases to 30 knots during the months April through September for a Southerly wind, and from June through September for a Westerly wind. This is a result of the ''baking action'' of the desert floor by the sun and the increase in desert foliage. Gusts alone without a sufficiently strong steady wind, will only lift the dust a few feet above the ground, it will then settle on the lee side of the brush. After the dust has been lifted by the steady wind the gusts lift larger quantities of dust into the atmosphere and force it to greater heights. The principal source regions for blowing dust are; the area in the vicinity of the mouth of Cajon Pass (to the South), the dry lake beds and mesa between George AFB and Palmdale (to the West), and the Mojave River Valley (to the North). The main difficulty in forecasting Blowing Dust at George AFB is whether the main body of dust will be carried through George AFB or on the outer perimeters. With a South wind, the air is funnelled through Cajon Pass and fanned out over the desert, while the center of the stream moves Northward through Apple Valley. The predominate dust layer travels with the main stream, with George AFB lying on the outer fringes. Blowing dust is not a problem during the summer months with a South wind, except when associated with thunderstorms. (Author)

AD-403 519 Div. 2
(TISTP/MFA) OTS price $14.00

Institute of Science and Tech., U. of Michigan, Ann Arbor.
A BIBLIOGRAPHY OF SEISMOLOGY FOR THE VELA UNIFORM PROGRAM. ADDENDUM NO. 3.
Apr 63, 210p. 4410 10B4
Unclassified report

Descriptors: *Seismic waves, *Bibliographies, Underground explosions, Abstracts.

Contents:
Research in Seismology
- Seismic Source Mechanisms
  - Earthquakes
  - Explosions
  - Seismic noise
  - Other artificial devices (Oscillators, Weight drops, etc.)
- Seismic Wave Propagation
  - Theoretical
  - Observational
  - Models
- Seismic Propagation Paths
  - U. S. Crustal Structure
  - Foreign Crustal Structure
  - Mantle and Core
  - Geophysical Constants (Seismic Velocity, Rock Density, etc.)
- Seismic Signal Detection
  - Surface
  - Array
  - Deepwell
  - Underwater
  - Special Purpose
- Seismic Data
  - Processing
  - Analysis
- General Studies (Includes Instrumentation)

AD-403 686 Div. 2
(TISTP/WH) OTS price $1.60

Naval Research Lab., Washington, D. C.
FIELD REVERSALS OF ''PALEOMAGNETIC'' TYPE IN COUPLED DISK DYNAMOS,
by John H. Mathews and W. K. Gardner. 27 Mar 63, 11p.
NRL 5886
Unclassified report

Descriptors: *Terrestrial magnetism, *Geophysics, *Magnetohydrodynamics, Analog computers.

Rikitake's adaptation of Bullard's simplified disk-dynamo model for the dynamo theory of the geomagnetic dipole was investigated further by means of an analog computer. A modified model having generalized interaction, which was suggested by an axial configuration, was also studied. A striking similarity is observed between the computer solutions and the geomagnetic polarity reversals inferred from paleomagnetic studies. Thus the magnetofluiddynamic origin of the earth's field becomes more plausible. (Author)

AD-403 691 Div. 2, 25
(TISTM/PCR) OTS price $1.60

Sacramento Peak Observatory, Sunspot, N. Mex.
A STUDY OF HYDROGEN LINES BROADENING IN AN INTENSE IMPULSIVE DISCHARGE,
by A. N. Babin, C. Y. Kukyanov, A. B. Severny, G. G. Sidorov, V. I. Sidnitsin, and others.
1962, 10p. SRN22
AFRCL 63 264

Unclassified report

Trans. from Izvest. Krim. Astrophys. Obs., 27:52-70, 1962.

Descriptors: *Solar radiation, *Hydrogen, Solar disturbances, Spectrum analyzers, Diffraction analysis, Diffraction gratings, Spectrophotometers, Plasma physics, Solar flares, Spectra (Visible and ultraviolet), Line spectrum.

Spectra of an intense impulsive discharge in hydrogen were obtained by means of a spectrograph with a diffraction Echelle-grating. A spectrophotometric study of the broadening of hydrogen emission wings gives the following results: (a) When observing the spectra of a self-contracted discharge in a perpendicular direction the emission of hydrogen line wings (extending to 30-40A) is broadened due mainly to the linear Stark effect; (b) At P = 0.5 mm Hg the emission extends to 50-80A and is broadened in the wing, probably due mainly to the quadratic Stark effect; (c) When the spectra are observed along the plasma discharge the broadening of hydrogen emission in the wings is due to macroscopic plasma motions with velocites about 10 to the 8th power cm/sec. The intensity variations in the wings are well explained by the supposition on directed plasma motion of the jet type along the axis of discharge with velocity gradients; (d) In observations outside the axis of discharge the broadening of hydrogen emission in the transversal as well as the longitudinal direction (near the discharge) is wholly due to the linear Stark effect. (Author)

AD-403 694 Div. 2
(TISTP/FR) OTS price $26.00

American U., Washington, D. C.
U. S. ARMY AREA HANDBOOK FOR THE IVORY COAST.
Dec 62, 485p.

Unclassified report

Descriptors: *Tropical regions, Sociology, Political science, Economics, Geography.

Contents:
Sociological background
  General character of the society
  Historical setting
  Geography and population
  Ethnic groups and languages
  Family
  Social structure
  Education and intellectual expression
  Religion
  Artistic expression
  Health and welfare
  Social values and patterns of living
Political background
  Constitution and government
  Political dynamics
  Foreign policy
  Information and propaganda
  Attitudes and reactions of the people
Economic background
  Character and structure of the economy
  Agriculture
  Industry
  Labor
  Domestic and foreign trade
  Financial system
National security
  Public order and internal security
  The Armed Forces

AD-403 708 Div. 2
(TISTP/WH) OTS price $8.60

Institute of Science and Tech., U. of Michigan, Ann Arbor.
THE GENERATION OF THE PRIMARY SEISMIC SIGNAL BY A CONTAINED EXPLOSION,
by Carl Kisslinger. Apr 63, 85p. 4410 48X
Contract SD78

Unclassified report

Report on VESIAC State-of-the-Art.

Descriptors: *Underground explosions, *Nuclear explosions, *Seismic waves, Seismographs, Shock waves, Wave transmission.

The region around the detonation is divided into three zones: (1) a strong-shock (hydrodynamic) zone, (2) a transitional, nonlinear zone, and (3) the elastic region. Experimental equation-of-state data are used in calculating the history of the propagating stress wave, because there is as yet no complete theory of the response of solids to rapidly applied stresses which exceed their yield and crushing strengths. Results indicate that the proper equations of motion are known, as are analytic and numerical methods for solving them. The theory of shock waves in a fluid is applicable to the close-in region, and several failure mechanisms have been postulated for the transition region. The objective of the analysis is the determination of the stress waveform at the inner boundary of elastic behavior. The peak amplitude and spectral content depend on the yield, the type of medium, and the ambient stress (depth of burial). The experimental determination of the shortest range at which elastic behavior begins is difficult in principle, because solutions valid at great distances are not applicable. (Author)

AD-403 753 Div. 2, 15
(TISTP/FEM) OTS price $7.60

Mathematics Research Center, U. of Wisconsin, Madison.
THE USE OF SINGULAR INTEGRALS IN WAVE PROPAGATION PROBLEMS; WITH APPLICATION TO THE POINT SOURCE IN A SEMI-INFINITE ELASTIC MEDIUM,
by M. Papadopoulos. Mar 63, 73p. TSR386
Contract DA11 022ORD2059

Unclassified report

Descriptors: *Mechanical waves, *Seismic waves, Integrals, Integral transforms, Functions, Partial differential equations, Equations, Trigonometry, Energy, Sources, Solids, Surfaces, Elasticity, Reflection, Refraction, Velocity, Theory, Propagation, Mathematical analysis.

The field due to a general point source of energy in an isotropic, elastic solid with a free surface is investigated. The development of new plane wave representations for the fundamental solutions of elastodynamics is reported. There are two types of situation involved; one is the simpler type involved in the case of a steady point source which moves steadily with any constant velocity in an elastic medium, this type involves superposition of plane waves with respect to a single parameter; the other is the more complicated transient problem in which a point source is set up at a given moment, and thereafter moves at constant velocity, without change of strength. The new representation for the field of a steadily moving source and for the transient source is used in the calculation of fields and displacements in the presence of a free surface. The application of the new approach to the case of a vertical load, to a horizontal load, and to a couple of arbitrary orientation, and the singularities to be expected for the general point source are discussed. (Author)

AD-403 773 Div. 2
(TISTP/FR) OTS price $3.60

Quartermaster Research and Engineering Command, Natick, Mass.
CASCADE ALP SLOPES AND GIPFELFLUREN AS CLIMA-GEOMORPHIC PHENOMENA,
by Will F. Thompson. Jan 63, 31p.
QREC TR ES6

Unclassified report

Descriptors: *Mountains, Terrain, Climatology, Erosion, Geology.

Certain topographic forms and relationships, and the processes which have caused them, are found to characterize the Cascades and other mid-latitude mountains, including the Alps, which have similar climates dominated by westerly winds off the sea. The relative frequency of summits at certain heights relative to timberline (gipfelfluren), and the occurrence of a certain kind of moderated surface (alp slope) at timberline, are found to be closely related to and indicative of regional climate. It is thus possible to determine the degree of climatic consistency which exists in the Cascade or similar regions, and to compare their climates with those of regions having similar, or consistently different, landscapes. Present climate in the Cascades is found to approximate that normal during Pleistocene interglacial times. However, warmer periods are shown to have occurred. (Author)

AD-403 860 Div. 2
(TISTP/FR) OTS price $1.60

Aerospace Information Div., Washington, D. C.
PHOTOMETRY OF SOLAR FLARES.
17 Apr 63, 15p.
AID T63 49

Unclassified report

Trans. from Akademiya nauk Kazakhskoy SSR. Astrofizicheskiy institut. Izvestiya, v. 14:93-106, 1962. (Copies also available from DDC)

Descriptors: *Solar flares, Motion-picture photography, Photometers, Spectrophotometers, Photographic analysis.

The results of the photometric processing of solar flares of importance equal to or greater then 2, observed from October 1957 to the end of 1959, are given. The observations were made at a high-mountain coronal station, 2600 m above sea level, in the region of Great Alma-Ata Lake, with the aid of the type-AFR-2 chromosphere-photosphere telescope. The motion picture was made in the hydrogen alpha line with an interference-polarization filter having a pass-band width of 0.6 A. Standard 35-mm panchromatic high-sensitivity (1000-1200 GOST Units) photographic film was used. The rate of filming was 2 frames a minute (sometimes 8 or 4). Standardization and calibration were effected through the insertion of a reducing screen with nine degrees of transparency, illuminated by the solar disk. In accordance with international instructions, the screen was inserted during normal, twice-normal, and four-times-normal exposures. The films were developed using the standard contrast-type fine-grain developer. (Author)

AD-403 862 Div. 2
(TISTP/FR) OTS price $1.60

Aerospace Information Div., Washington, D. C.
CATALOG OF PHOTOGRAPHIC, PHOTOVISUAL, AND PHOTORED MAGNITUDES OF 22,000 STARS.
25 Apr 63, 12p.
AID T63 51

Unclassified report

Trans. from Kiyev, Izd-vo AN USSR, pp. 173, 1962.

Descriptors: *Stars, Brightness, Photographic analysis, Catalogs.

The catalog contains the results of determining stellar brightness in three types of light in selected regions of the Milky Way. It includes nearly all stars brighter than photographic magnitude 13.5. (Author)

AD-403 864 Div. 2, 16
(TISTP/JW) OTS price $1.60

Aerospace Information Div., Washington, D. C.
MICROMETEOROLOGY, AEROSOLS, AND AIR POLLUTION.
25 Apr 63, 13p.
AID B63 50

Unclassified report

Descriptors: *Micrometeorology, *Aerosols, *Atmospheric pollution, Bibliographies.

AD-403 928 Div. 2
(TISTP/FR) OTS price $1.10

Minnesota U., School of Physics, Minneapolis.
BALLOON FLIGHT RECORD STATUS REPORT AS OF 31 DECEMBER 1962,
by John R. Winckler. Apr 63, 2p.

Unclassified report

Descriptors: *Meteorological balloons, Flight, X rays, Electrons, Measurement, Instrumentation.

Balloon flights were launched from Minneapolis, Fort Churchill, Manitoba, and Kerguelen Island in the South Indian Ocean. The flights used either standard monitoring apparatus or the scintillation counters to obtain more specific data about x-rays resulting from electron precipitation. Besides the launchings made simultaneously at Kerguelen and Minneapolis in September 1962, coordinated launchings were made at Minneapolis and Fort Churchill. These latter experiments were to measure x-rays resulting from electron precipitation during magnetic storms at high latitudes. The tabulation gives the flight number, launch time, launch location, duration, and type of instrumentation used on each

of the flights. The flight duration is measured from launch time. The floating pressure altitude of the current balloon system is 6 mb. In general, the flights attained this altitude about two hours after the stated launch time. The balloons do not always float at a constant altitude, however, so that the detailed time-pressure curve for each flight is necessary for final analysis. (Author)

AD-403 983 Div. 2
(TISTE/JWS) OTS price $4.60

Radio Observatory, Calif. Inst. of Tech., Pasadena.
OBSERVATIONS OF THE OWENS VALLEY RADIO OBSERVATORY CALIFORNIA INSTITUTE OF TECHNOLOGY PASADENA, CALIFORNIA 1963. 4. ACCURATE MEASUREMENT OF THE DECLINATIONS OF RADIO SOURCES,
by Richard Bradley Read. 1963, 22p.
Unclassified report

Descriptors: *Radio interferometers, *Radio astronomy, *Extraterrestrial radio waves, Radio receivers, Phase control devices, Phase-locked communications systems, Klystrons, Calibration, Errors, Antenna lobes, Radio ranges, Ultra high frequency, Parabolic antennas, Sources.

The two 90-foot steerable paraboloids of the Owens Valley Radio Observatory were used as a two-element interferometer at 960 mc with various separations along a north-south baseline to measure accurately the declinations of a number of radio sources, most of which were of small diameter. The measured values of declination are tabulated for 110 sources with right ascensions between 0 hours and 14 hours 10 minutes. The standard errors of the measured values range from ± 2.6 seconds of arc to ± 46 seconds of arc with an average of ± 13 seconds of arc. A discussion of the sources of error is included. (Author)

AD-403 993 Div. 2
(TISTP/FR) OTS price $3.60

American Meteorological Society, Boston, Mass.
DETAILED OCEANOGRAPHIC RESEARCH IN THE REGION OF THE KURILE-KAMCHATKA DEEP IN MAY-JULY 1953 (Kompleksnye okeanograficheskie issledovaniia v raione Kurilo-Kamchatskoi vpadiny v mae-iiule 1953 g),
by L. A. Zenkevich and A. N. Bogoiavlenskii.
Dec 62, 33p. TR390
Contract AF19 604 6113
Unclassified report

Trans. from Institut Okeanologii, Trudy, vol. 16, pp. 24-46, 1959.

Descriptors: *Oceans, Temperature, Salinity.

The main task of the described voyage of the expeditionary ship, Vitiaz, was to make complex oceanographic investigations in the region of the Kurile-Kamchatka deep. Bottom relief, bottom deposits, the hydrological structure of water masses, heavy (rough) seas, and also the distribution of bottom fauna and flora (plankton, benthos, fish, microbes) were studied. Geological investigations of the Kurile ridge necessitated extending the operations to the southeast and to the north - into the region of the Pacific Ocean, i.e., the range of the entire Kurile-Kamchatka sector of the western-Pacific line of watersheds of the earth's surface: the southern basin of the Okhotsk Sea, the area of the Kurile ridge, the Kurile deep and the adjacent subsurface plateau of the Pacific Ocean, and also the area of the junction of the Kurile-Kamchatka and Aleutian systems. (Author)

AD-404 009 Div. 2
(TISTP/FR) OTS price $2.60

Naval Oceanographic Office, Washington, D. C.
LONG-RANGE ICE OUTLOOK EASTERN ARCTIC (1963).
Apr 63, 19p.
Unclassified report

Descriptors: *Ice, Oceans, Drift.

Extensive evaluation of available information indicates that present ice conditions in the Labrador Sea and along the Newfoundland coast are nearly similar to those observed in 1959; the analogous year in the Thule approaches is 1956. Goose Bay and Itivdleq are expected to open later than normal, whereas Thule and Sondrestrom will open earlier than normal. Kulusuk should open near the normal dates. In terms of the 1962 ice season, it is expected that Goose Bay and Thule will open about the same time as last year, whereas Sondrestrom and Itivdleq will open slightly later than they did in 1962. Kulusuk should be open to escorted shipping about a week earlier than last year but will not be able to receive unescorted shipping until mid-August, about 15 days later than in 1962. (Author)

AD-404 020 Div. 2, 20
(TISTP/GRW)OTS price $4.60

Washington U., Seattle.
PRELIMINARY REPORT ON THE SEDIMENTS AND RADIOACTIVITY IN THE VICINITY OF THE COLUMBIA RIVER EFFLUENT. BROWN BEAR CRUISE 291, 29 JULY TO 12 AUGUST 1961 BROWN BEAR CRUISE 311 23 JULY TO 14 AUGUST 1962,
by M. Grant Gross, Dean A. McManus, and Joe S. Creager. Jan 63, 32p. TR84;M63 2
Contract Nonr477 10, Proj. NR083 012
Unclassified report

Descriptors: *Sedimentation, *Radioactivity, River currents, Ocean bottom sampling, Radioactive waste, Microorganisms, Tables, Silt, Gamma-ray spectra.

The sediments in the area affected by the runoff from the Columbia River were studied to determine the distribution of sediment types and the presence and amount of radioactivity in the sediments. The study of the dispersal processes and distributional patterns of the sediment and its radioactivity is in the initial phase of a three-phase program. Various sedimentological analyses of 178 samples provided preliminary data on sediment distribution. The inner part of the continental shelf is covered with sand which grades into silt along the outer part of the shelf. The sediment of the abyssal plains is principally a silty clay, although local coarsening of the sediment is produced by the accumulation of tests of microorganisms. The presence of quartz sand in samples from the abyssal plain appears to be restricted to those samples collected from deep-sea channels. Analyses of the gamma-ray spectra of sediments collected near the Columbia River mouth in 1961 indicate that radionuclides, in addition to the naturally occurring potassium-40, are present in the sediments. The sandy sediments from Grays Harbor and the beaches adjacent to the Columbia River had very low activities although chromium-51, zinc-65, cobalt-57 and cobalt-60 were detected. (Author)

AD-404 021 Div. 2
(TISTP/MFA) OTS price $6.60

Boston Coll., Mass.
RESEARCH DIRECTED TOWARD THE STUDY OF RAPID

FLUCTUATIONS OF THE GEOMAGNETIC FIELD,
by Daniel Linehan. 31 Oct 62, 1v.
Contract AF19 628 211, Proj. 8601, Task 860103
AFCRL 63 436

Unclassified report

Descriptors: *Terrestrial magnetism, Geophysics, Electronic equipment, Instrumentation, Diodes, Detectors, Signal generators, Measurement, Calibration, Analysis.

Research was directed toward the study of rapid fluctuations of the geomagnetic field. An investigation was made of the characteristics and origins of the natural magnetic field fluctuations in the frequency range of approximately 0.01 to 50 cps with particular emphasis on frequencies from about 0.1 to 3 cps. Field records were made of the fluctuations. Early records obtained for analysis and a study into the relationship of the results to magnetic disturbances and other geological phenomena were provided to Air Force Research Cambridge, Terrestrial Science Group. The work described in this report covers the hardware phase of the installation of the measurement facilities at Strawberry Hill Field site Concord, Massachusetts. A description of the instrumentation and early measurements taken are given. Full time data gathering of the 0.01 to 3 cps geomagnetic fluctuations is in progress at the conclusion of this contract. (Author)

AD-404 028 Div. 2, 25
(TISTP/FR) OTS price $7.60

Stanford Research Inst., Menlo Park, Calif.
RADIATIVE ENERGY TRANSFER FROM NUCLEAR DETONATIONS ABOVE 50-KM ALTITUDE,
by R. I. Miller and T. O. Passell. 30 Apr 63, 60p.
Contract OCD OS62 135

Unclassified report

Descriptors: *Nuclear explosions, High altitude, Thermal radiation, Wave transmission, X rays, Absorption, Atmosphere.

The thermal energy flux expected at optimally oriented surfaces at the earth's surface from nuclear bursts detonated above 50 kilometers altitude has been computed from basic physical principles. The chief principles involved are a) absorption by the earth's atmosphere of a black-body X-ray spectrum from a point source near 10 to the 7th degrees K; (b) heating of air to some temperature depending upon its known internal energy-temperature function; (c) radiative cooling of the heated air assuming thermal equilibrium; (d) disposition of the radiant emission into three energy bands; cold oxygen absorption band, ozone absorption band, and the atmospheric passband. (Author)

AD-404 029 Div. 2
(TISTP/GRM) OTS price $3.60

Washington U., Seattle.
A MODEL STUDY OF THE STEADY-STATE SALINITY DISTRIBUTION IN PUGET SOUND,
by Harlow G. Farmer and M. Rattray, Jr.
10 Sep 62, 33p. TR85; M62 29
Contract Nonr47710, Proj. NR083 012

Unclassified report

Descriptors: *Salinity, *Ocean bottom, Depth finding, Periodic variations, Tides, Tables, Harbor models.

The steady-state salinity distribution in Puget Sound was obtained, using an oceanographic model. Seven stations located in the several main divisions of Puget Sound were selected and salinity profiles were obtained, at each, for three conditions of fresh water runoff and for five values of tidal range. Low monthly, annual, and high monthly mean values of runoff were used, with limits of the tidal range exceeding those generally observed in Puget Sound. The salinity at all stations in Puget Sound is observed to be strongly dependent on the characteristics of the tidal flow in Admiralty Inlet. The shape of the salinity profile at a station is also observed to be constant for constant values of a quantity representative of the ratio of tidal flow to total runoff. Certain other features of the circulation are deduced. (Author)

AD-404 041 Div. 2
(TISTP/FR) OTS price $2.60

Marine Lab U. of Miami, Coral Gables, Fla.
A SUGGESTED OUTLINE FOR THE MEGASCOPIC DESCRIPTION OF MARINE SEDIMENTARY CORES,
by Gene A. Rusnak and Stanley J. Luft. Feb 63, 63 1; 63197.
Contract Nonr400802

Unclassified report

Descriptors: *Sedimentation, Classification, Ocean bottom sampling.

Contents:
Introduction
General instructions
Logging procedure
  Depth
  Classification
  Lithology
  Color
  Sampling data
  Descriptive text
Methods for classification
  Abbreviations
  Semi-quantitative nomenclature
  Determinative procedures
  Texture
  Wentworth scale
  Physical character
  Bedding
  Nodular and concretionary structure
  Organic constituents
  Miscellaneous features
Bibliography
Appendix

AD-404 043 Div. 2
(TISTP/FEM) OTS price $4.60

Stanford Research Inst., Menlo Park, Calif.
CLIMATOLOGICAL APPLICATIONS OF VERTICALLY POINTING WEATHER RADAR OBSERVATIONS,
by Roy H. Blackmer and Myron G. H. Ligda. Feb 63, 39p. SR5
Contract AF19 604 7312, Proj. 8624, Task 86242
AFCRL 63 299

Unclassified report

Descriptors: *Meteorological radar, *Clouds, Angle of arrival, Antennas, Scanning, Radar equipment, Radar scanning, Cumulus clouds, Thickness, Thunderstorms, Climatology, Punched cards, Radar signals, Simulation, Cloud height indicators, Statistical distributions.

The potential climatological utilization of vertically pointing weather radar observations is discussed. The optimum tilt angle and antenna rotation rate to detect scattered clouds that are

often missed by a fixed vertical antenna are included. Examples of the probable appearance of several cloud distributions as shown by fixed and scanning antennas are presented. A method of summarizing the data for climatological purposes by the utilization of punched cards is presented in the final section of the report. (Author)

AD-404 047 Div. 2
(TISTP/FEM) OTS price $3.60

Stanford Research Inst., Menlo Park, Calif.
CLOUD RESEARCH DATA.
Final rept.,
by S. M. Serebreny and R. H. Blackmer, Jr.
Feb 63, 27p.
Contract AF19 604 7312, Proj. 8624, Task 86242
AFCRL 63 400

Unclassified report

Descriptors: *Clouds, *Cloud cover, Meteorological radar, Meteorological satellites, Meteorological parameters, Ceiling, Statistical distributions, Frequency, Visibility, Cumulus clouds, Aerial photography, Research program administration, Aerial photographs.

A summary and analysis of research on cloud cover conducted over a three-year period is presented. During this time various sources of cloud data such as WBAN-10 reports, whole-sky photographs, vertically pointing radar records, and high-altitude photographs from U-2 aircraft and TIROS satellites were subjected to detailed analyses. From these analyses we were able to obtain knowledge of: (1) the occurrence of multiple layers of clouds, (2) the frequency with which upper layers above an overcast may not be detected by a surface observer, (3) the length, width, and height of cumuliform clouds, and (4) the size distributions of cloud elements composing a given number of tenths of cumulus cloud cover. Examples of our methods of treating these data, including pertinent illustrations and tables, are presented to indicate the detail with which the contract objectives were achieved. (Author)

AD-404 059 Div. 2
(TISTP/MFA) OTS price $4.60

Wolf Research and Development Corp., West Concord, Mass.
OPTICAL GENERATOR PROGRAM,
by Harry R. Kahler, Richard M. Moroney, and William T. Nixon. Feb 63, 37p.
Contract AF19 604 8065, Proj. 7600, Task 760003
AFCRL 63 445

Unclassified report

Descriptors: *Geodesics, *Satellites (Artificial), Input-output devices, Stroboscopes, Optical equipment, Generators, Cameras, Earth, Astronomical geodesics, Terrestrial magnetism, Navigation, Programming (Computers).

The program described was devised primarily to provide acquisition data to a ground-based instrumentation net consisting mainly of various types of cameras. The cameras are employed to photograph a flashing strobe light that is mounted on each pole of the ANNA geodetic satellite that is magnetically stabilized along its spin axis. Provisions were made to compute a satellite ephemeris by a differential correction procedure as the satellite is stepped around the orbit in some desired increment of time. (Author)

AD-404 060 Div. 2
(TISTP/MFA) OTS price $5.60

Radio Observatory, Calif. Inst. of Tech., Pasadena.
OPTICAL IDENTIFICATION OF 3C 48, 3C 196, AND 3C 286 WITH STELLAR OBJECTS,
by T. A. Matthews and A. R. Sandage. 1963, 1v.
Contract Nonr22019

Unclassified report

Descriptors: *Radio astronomy, Radio waves, Stars, Galaxies, Photometers, Photoelectric effect, Optical properties, Interferometers, Colors, Electrons, Relativity theory, Ultraviolet radiation, Blackbody radiation, Antennas, Measurement.

Radio positions of the three sources were determined with the two 90-ft antennas working as an interferometer with an rms accuracy in both coordinates better than 10 sec of arc. Direct photographs show that a star-like object exists within the error rectangle at each of the source positions. Exceedingly faint wisps of nebulosity are associated with the stars in 3C 48 and 3C 196. The observations are incomplete for 3C 286 in this regard. Photoelectric photometry of the stars shows each to have quite peculiar color indices, most closely resembling the colors of old novae, or possibly white dwarfs, but the authors are not suggesting identification with these types of stars. Optical spectra for 3C 48 show several very broad emission features. It is shown that the radiant flux in the optical region can be computed from the radio flux data and the theory of synchrotron radiation for 3C 48 and 3C 196, but not for 3C 286. This, together with other arguments, suggests that the optical as well as the radio flux could be due to the synchrotron mechanism, but the arguments are not conclusive. (Author)

AD-404 061 Div. 2
(TISTP/MFA) OTS price $1.10

Radio Observatory Calif., Inst. of Tech., Pasadena.
AN ATTEMPT TO MEASURE THE GALACTIC MAGNETIC FIELD,
by D. Morris, B. G. Clark, and R. W. Wilson.
1963, 5p.
Contract Nonr22019

Unclassified report

Descriptors: *Radioastronomy, *Magnetic fields, Instrumentation, Antennas, Polarization, Interferometers, Electronic equipment, Absorption, Atomic spectroscopy, Hyperfine structure, Measurement, Galaxies.

Measurements were made in November, 1961, and February, 1962, in an attempt to determine the galactic magnetic field by the Zeeman splitting of the 21-cm line. The present observations were confined to two absorption lines, one in the spectrum of Cas A (at a frequency of approx. equal to 0 kc with respect to the natural line frequency, after correction to the local standard of rest) and the other in the spectrum of the Crab Nebula (at a frequency of approx. equal to -50 kc). (Author)

AD-404 065 Div. 2
(TISTP/MFA) OTS price $6.60

Geotechnical Corp., Garland, Tex.
DEEP-HOLE SEISMOMETER (VARIABLE-RELUCTANCE TYPE).
Final rept.
31 Jan 63, 1v. TR63 15
Contract AF33 600 43369, Proj. VT1139 Task 1A-1G

Unclassified report

Descriptors: *Seismographs, *Seismic waves, Geophysics, Seismological stations, Instrumentation, Transducers (Acoustic), Positioning devices (Machinery), Design, Measurement.

A variable-reluctance seismometer suitable for long-term operation in a deep well was designed, constructed, and laboratory-tested. The seismometer was operated in a deep well near Grapevine, Texas, and in a deep well near Hobart, Oklahoma. The field operations showed that the seismometer meets the design objectives and is satisfactory for use in more extensive field programs. (Author)

AD-404 072 Div. 2
(TISTP/MFA) OTS price $8.10

Technical Military Planning Operation, General Electric Company, Santa Barbara, Calif.
GRAPHIC DISPLAYS OF GEOMAGNETIC GEOMETRY.
by Walter F. Dudziak, David D. Kleinecke, and Theodore J. Kostigen. 1 Apr 63, 60p. RM 63TMP 2
Contract DA49 146XZ109
DASA 1372 Unclassified report

Original contains color plates; all DDC reproductions will be in black and white. Original may be seen in DDC Hq.

Descriptors: *Terrestrial magnetism, *Magnetic fields, Magnetic properties, Plasma physics, Geophysics, Charged particles, Motion, Equations, Partial differential equations, Polynomials, Earth, Potential theory, Aurorae, Geometry, Maps.

Sixty maps are presented on computational data pertaining to the geometric properties of the geomagnetic field and a brief related theoretical description to make this material more meaningful. The maps display (1) the values of total field intensity (B) and McIlwain's magnetic shell parameter (L) for altitudes from zero to two thousand kilometers, (2) the detailed value of total field intensity near the South Atlantic anomaly, (3) the traces in both hemispheres of points with a fixed value of B and L and (4) some other geomagnetic properties. The description includes tables of the geomagnetic coefficients used and a description of the codes utilized. The maps have been carefully checked. Because of the magnitude of this task and the wide distribution, notification of any detectable errors which may have been overlooked would be appreciated. (Author)

AD-404 092 Div. 2
(TISTP/FR) OTS price $2.60

Navy Underwater Sound Lab., Fort Trumbull, New London, Conn.
THE IRREGULAR DISTRIBUTION OF DEEP-OCEAN SEDIMENTS,
by P. L. Bezrukov, tr. by C. N. K. Mooers.
27 Mar 63, 24p.
Proj. 1 409 00 00.
USL 575
Unclassified report

Trans. from OCEANOLOGY. 2:1, Publication of the Academy of Sciences, USSR, Moscow, USSR, 1962.

Descriptors: *Sedimentation, Ocean bottom, Ocean currents, Ocean bottom topography, Distribution.

Relatively recent discoveries of the irregular distribution of deep ocean sediment chemical and granular composition as well as thickness are reviewed. The contributing phenomena are identified: complex bathymetry; suspension currents; volcanic, ice, and freshet transport; organic activity; and autogenesis. The increased density of geological observations, an intense study of a limited bottom area, the development of near-bottom current meters, and the creation of improved charting techniques are vigorously indicated as being required for the thorough study of ocean bottom properties. (Author)

AD-404 183 Div. 2
(TISTP/FEM) OTS price $6.60

Ballistic Research Labs., Aberdeen Proving Ground, Md.
ORDVAC PROGRAMS FOR STAR IDENTIFICATION AND COMPUTATION OF STANDARD COORDINATES,
by A. Roberta Wooten. Jan 63, 71p.
Proj. 1M2229018215
BRL MR1451 Unclassified report

Descriptors: *Stars, Cameras, Computers, Programming (Computers), Punched cards, Identification.

Using the camera orientation elements derived from several known stars or determined from instruments, the Star Identification Program serves to identify all other photographed stars. After proper identification the Computation of Standard Coordinates Program is used to compute the coordinates of the control points for the camera orientation. (Author)

AD-404 189 Div. 2, 12, 6
(TISTP/JEA) OTS price $9.10

Ballistic Research Labs., Aberdeen Proving Ground, Md.
SUMMARY REPORT ON STRONGARM ROCKET MEASUREMENTS OF ELECTRON DENSITY TO AN ALTITUDE OF 1500 KILOMETERS,
by Spence T. Marks, Charles E. Shafer, William J. Cruickshank, Raymond E. Prenatt, and George A. Dulk. Jan 63, 110p.
Proj. 1A011001B021
BRL 1187
Unclassified report

Descriptors: *Electron density, *Atmosphere, *Electron density, *Ionosphere, Propagation, Launch vehicles (Aerospace), Rocket motors (Solid propellant), Airborne, Instrumentation, Exosphere, Measurement, Nose cones, Height finding, Recording systems, Meteorological parameters, High altitude, Upper atmosphere, Mathematical analysis.

A summary is presented which covers all phases of a project for the measurement of electron density to an altitude of 1500 kilometers by employing a five-stage solid propellant rocket combination known as the Strongarm, and a two-frequency propagation experiment. Included are sections which describe the theory applicable to the measurements, the rocket vehicle, the airborne instrumentation, the ground instrumentation, the vehicle performance, and the experimental results. An early morning electron density profile to an altitude of 1500 kilometers is presented, together with a daytime and a nighttime profile to 650 kilometers. A model of the ionospheric inhomogeneities which existed during the daytime rocket flight is given. Scale heights and exospheric temperatures derived from the profiles are also presented and discussed. (Author)

AD-404 227 Div. 2
(TISTP/FEM) OTS price $1.10

Air Force Cambridge Research Labs., Bedford, Mass.
MEASUREMENT RANGE REQUIRED OF METEOROLOGICAL EQUIPMENT,
by Arnold Court and Henry Salmela. Feb 63, 2p.
IFGAA22S
Proj. 8624
AFCRL 62 825 S1
Unclassified report

Descriptors: *Meteorological instruments, Air mass analysis, Temperature, Wind, Gusts, Barometric pressure, Measurements.

AD-404 231 Div. 2, 6
(TISTP/FEM) OTS price $1.60

Army Missile Command, Redstone Arsenal, Huntsville, Ala.
DETECTION AND DESIGNATION,
by Robert H. C. Au, Orlando E. Katter, Jr., E. J. Little, and William J. Schultis. 28 Sep 60, 14p. M2
Unclassified report

Descriptors: *Atmosphere, *Barometric pressure, *Atmosphere entry, Detection, Atmosphere models, Reentry vehicles, Hypersonic flight, Motion, Heating, Numerical analysis, Density, Aerodynamic heating.

Two properties of the earth's atmosphere which are pertinent to the description of the phenomenon associated with the reentry of a hypersonic body are discussed. These two properties, density and pressure, are functions of the geometric altitude and vary in a manner which can be approximated by exponential relations. Specific relations for the properties are given for altitudes up to 350 Kft. Since the altitude regime was considered in several increments and the most recent data was utilized i.e., The 1959 Model ARDC Atmosphere, the approximations provide a reasonably accurate determination of the atmospheric property values. In addition, the relations are in a form amenable to incorporation into expressions of motion and aerodynamic heating parameters. (Author)

AD-404 387 Div. 2
(TISTP/MFA) OTS price $4.60

Electrical Engineering Research Lab., U. of Texas, Austin.
A SURVEY OF GEOMAGNETIC MICROPULSATION RESEARCH CONDUCTED IN CONNECTION WITH THE CO-OPERATIVE GEOMAGNETIC MICROPULSATION MEASUREMENT PROGRAM,
comp. by H. W. Smith. 15 May 63, 44p. 130
Contract Nonr37514, Proj. NR371 032
Unclassified report

Descriptors: *Terrestrial magnetism, Electric currents, Recording systems, Earth, Standards, Feasibility studies Measurement.

At a conference on geomagnetic micropulsations held at the University of California on August 12-14, 1962 a committee was formed from representatives of the several research groups in attendance to conduct a survey to determine the desirability of a co-operative measurement program. The favorable response from this survey resulted in the formation of the Co-Operative Geomagnetic Micropulsation Measurement Program. This report contains a condensed summary of a survey form mailed to all research groups in the United States and Canada known to have an interest in geomagnetic micropulsations. (Author)

AD-404 425 Div. 2
(TISTE/JWS) OTS price $1.60

Visibility Lab. U. of Calif, San Diego.
GROUND-BASED. MEASUREMENTS OF EARTH-TO-SPACE BEAM TRANSMITTANCE, PATH RADIANCE, AND CONTRAST TRANSMITTANCE,
by S. Q. Duntley. May 63, 1v.
Contract AF33 657 7739, Proj. 6220 Task 622009
Unclassified report

Descriptors: *Light transmission, *Colorimetric analysis, Aerial photography, Surface targets, Optical filters, Low altitude, Telephotolenses, Photometers, Measurement, Light transmission.

Vertical ground-to-space beam transmittan e, path radiance, and contrast transmittance for green light was measured from a ground station on ten occasions during August and September 1962. On each occasion a Reconnaissance Laboratory photographic airplane photographed a pattern of white, grey, and black targets on the ground adjacent to the Visibility Laboratory equipment. The targets were radiometrically monitored by Cornell Aeronautical Laboratory in such a manner that target-to-aircraft beam transmittance, path radiance, and contrast transmittance could be obtained from the aerial photographs. The intended purpose of this joint experiment is a comparison of the target-to-space data predicted by the ground-based instruments with the ground-to-aircraft photographic data. The ground-based data are presented in this report, but comparison with the aerial data must await the completion of data reduction from the aerial photographs by Cornell Aeronautical Laboratory. (Author)

AD-404 465 Div. 2
(TISTP/MFA) OTS price $4.60

Laboratories for Research and Development, Franklin Inst., Philadelphia, Pa.
REFRACTION IN SELECTED MODEL ATMOSPHERES III.
Interim technical rept. no. 1,
by James K. Gleim, Robert S. Grubmeyer, John E. Merrill and William M. Protheroe. 12 Feb 63, 41p. I A2217 1
Contract DA44 009eng3767, Proj. 8T35 12 001 01
Unclassified report

Report on Research in Surveying, Mapping, and Geodesy.

Descriptors: *Geodesics, *Atmospheric refraction, Meteorology, Tropical regions, Refractive index, Meteorological parameters, Temperature, Pressure, Moisture, Water vapor, Tables, Atmosphere models, Mapping, Analysis.

An investigation of the astronomical refraction in spherically-stratified model atmospheres is made. Previously, the study of the refraction in the 1959 ARDC model was presented. The astronomical refraction in tropical and arctic winter atmosphere models at zenith distances of 60 and 85 degrees is investigated. The procedure is similar to that used in the study of the 1959 ARDC model; the results show satisfactory agreement with their respective values computed from the Willis and Pulkovo tables. Also included is a sample calculation for a homogeneous atmosphere, considered as a limiting case. Again the results show good agreement with Pulkovo, to rather considerable zenith distances. The effect of injecting water vapor into the dry 1959 ARDC model was examined. The procedure consisted in revising the value of the index of refraction at each level where necessary, using the Barrell-Sears expression for n.

The results indicate that for a zenith distance of 60 degrees there is no difference in the contribution to the total refraction between the dry and humid models above 15 km altitude, and for a zenith distance of 85 degrees, there is no difference between the two models above 30 km. (Author)

AD-404 502 Div. 2
(TISTP/WH) OTS price $1.10

4th Weather Wing, Colorado Springs, Colo.
AN OBJECTIVE AID FOR FORECASTING STRONG AND GUSTY SURFACE WINDS,
by Thomas H. Simmonds. May 63, 6p.
4WW TP63 5 Unclassified report

Descriptors: *Weather forecasting, *Gusts, *Dust storms, Weather stations, Storms, Turbulence, Climatology, Snow, Wind.

Forecasting the occurrence of operationally critical values of strong surface winds with accompanying gusts presents a major problem at Grand Forks AFB, N. Dakota. This investigation was conducted to develop an objective aid for forecasting such critical values. (Author)

AD-404 513 Div. 2, 30
(TISTP/MFA) OTS price $5.60

Quartermaster Research and Engineering Command, Natick, Mass.
PUBLICATIONS IN THE EARTH SCIENCES.
Dec 62, 56p.
Proj. 7X 83 01 008
QREC 19TR ES 1 Unclassified report

Descriptors: *Geography, *Bibliographies, Climatology, Terrain, Geology, Deserts, Tropical regions, Mountains, Soils, Micrometeorology, Permafrost, Clothing, Logistics, Ecology, Polar regions, Reports, Documentation.

This report lists all the earth science reports that have been published since the start of the earth sciences program in the Quartermaster Corps in 1942. The reports cover geography and its subfields, including climatology, geomorphology, and biogeography of plants and animals, including man. (Author)

AD-404 523 Div. 2, 30
(TISTE/JWS) OTS price $9.60

General Dynamics/Convair, San Diego, Calif.
DEVELOPMENT OF A TELEMETERING OCEANOGRAPHIC BUOY.
Progress rept.
Feb 63, 103p. 63 060
Contract Nonr306200, Proj. NR083 147
Unclassified report

Descriptors: *Buoys, *Telemeter systems, *Oceanographic equipment, Model basins, Model tests, Models, Discone antennas, Antenna radiation patterns, Omnidirectional antennas, Ultra high frequency, Transducers, Multiplex, Data storage systems, Data transmission systems, Command and control systems, Telemetering receivers, Telemetering transmitters.

A comparative study of the drag of shapes proposed for buoy hulls, a life test at sea of an unattended electric power system, a study of antennas for long-distance ionospheric telemetry from buoys, and a study into the methods and equipment available to give an oceanographic buoy the data capability required were conducted. Each buoy should have a capability of accepting 100 channels of data, of telemetering these data 4 times each 24 hours over distances as great as 2000 miles on command from shore, and of storing the data in the buoy for its design station endurance of one year. (Author)

AD-404 585 Div. 2, 4, 8
(TISTP/FEM) OTS price $2.60

Geophysics Corp. of America, Bedford, Mass.
CHEMICAL RELEASE STUDIES IV: CHEMISTRY OF UPPER ATMOSPHERE RELEASES,
by D. Golomb and A. W. Berger. Jan 61, 22p.
TR61 10A
Contract AF19 604 7269
AFCRL 229 Unclassified report

Descriptors: *Gas ionization, *Chemical reactions, *Upper atmosphere, Aluminum compounds, Barium compounds, Potassium compounds, Nitrates, Ionization, Vapors, Rockets, Plasma sheath, Pressure, High altitude, Propagation, Chemistry.

Artificial (ionized or unionized) cloud generations in the upper atmosphere are analyzed in terms of two successive processes: first, formation of the initial reaction products and second, evaluation of the non-equilibrium kinetic processes during expansion. The aluminum-potassium nitrate and the aluminum-barium nitrate reactions are analyzed in detail. Other prospective systems are surveyed. Models for recombination during expansion of the reaction products are set up. Methods for improvement of chemical and ionization yield are suggested. (Author)

AD-404 587 Div. 2
(TISTP/WH) OTS price $1.60

Institute of Science and Tech., U. of Michigan, Ann Arbor.
VESIAC MONTHLY BULLETIN OF VELA UNIFORM RESEARCH PUBLICATIONS.
15 May 63, 11p. B4
Unclassified report

Descriptors: *Bibliographies, *Nuclear explosions, Seismic waves, Underground explosions.

AD-404 664 Div. 2
(TISTP/WH) OTS price $6.60

Data Analysis and Technique Development Center, United Electrodynamics, Inc., Alexandria, Va.
LONG RANGE SEISMIC MEASUREMENTS, COLONA EARTHQUAKE (COLORADO) 5 FEBRUARY 1962.
8 Feb 63, 1v. 50
Contract AF33 657 7427
AEC NP12594 Unclassified report

Descriptors: *Seismic waves, *Nuclear explosions, *Earthquakes, Tables, Seismographs, Underground explosions.

Long range seismic measurements of the Colona earthquake (Colorado, Feb 62) gathered at 36 mobile stations are presented.

3. CHEMICAL WARFARE EQUIPMENT AND MATERIALS

AD-403 861 Div. 3, 32
(TISTM/SAT) OTS price $3.60

Aerospace Information Div., Washington, D. C.
CHEMICAL AND BIOLOGICAL WARFARE (USSR).
30 Apr 63, 34p.
AID B63 52
Unclassified report

Descriptors: *Biological warfare, *Chemical warfare, *Bibliographies.

AD-404 243 Div. 3, 6, 4
(TISTM/PCR) OTS price $1.10

Southern Research Inst., Birmingham, Ala.
(No title),
by Alvin N. Bird, Jr. 17 May 63, 4p.
Contract DA18 108AMC32
Unclassified report

Descriptors: *Detectors, *Chemical warfare agents, *Particle size, *Aerosols, Instrumentation, Electrochemistry, High speed cameras, Gels, Cellulose, Oximes, Hydrogen compounds, Cyanides, Sensitivity, Aluminum compounds, Image intensifiers (Electronics), Image tubes, Phosphorescent materials, Counting methods, Circuits, Pictures, Flash lamps.

The response time of the electrochemical cell was investigated. An average response time of about three seconds was obtained with a new cell. The cell was made with a methyl cellulose gel that was prepared with an oxime solution. The response was measured with a cyanide generator delivering about two micrograms per liter of HCN. The sensitivity was about the same as that of the standard oxime cells. A response time of about six seconds was measured with the thin film cell; but evaporation of the electrolyte was a serious problem with this cell. Drying of the gel will be a problem with the field use of the new cell, but a cell will be designed to keep the proper amount of water in the gel. (Author)

4. CHEMISTRY

AD-403 520 Div. 4
(TISTM/TCG) OTS price $1.60

Army Chemical Research and Development Labs., Army Chemical Center, Md.
METHODS OF MICROANALYSIS, VIb OXYGEN DETERMINATION; EVALUATION OF THE MAGNESIUM NITRIDE METHOD FOR FLUORINE-CONTAINING COMPOUNDS,
by Stewart S. Cruikshank. Feb 63, 17p.
ACRDL CRDLR3160 Unclassified report

Descriptors: *Oxygen, *Oxygen compounds, *Halocarbon plastics, *Organic compounds, Fluorine, Interference, Test methods, Halogens, Pyrolysis, Magnesium compounds, Nitrides, Microanalysis, Chemical analysis, Organic compounds, Others.

Fluorine causes the most serious interference with oxygen determination of all the elements encountered. Inserting Mg_3N_2 in the pyrolysis tube to eliminate this interference has been recommended. It was found necessary to modify the method given for preparing Mg_3N_2 to obtain any appreciable yield. Mg_3N_2 applied as recommended or with modifications does not reduce appreciably the F interference in direct oxygen determinations. The Pt pyrolysis tube method devised will be further developed as a means of determining oxygen in fluorine-containing compounds. (Author)

AD-403 725 Div. 4
(TISTM/AW) OTS price $1.75

Politecnico di Milano (Italy).
RESEARCH ON HYDROGEN OVERVOLTAGE ON METALLIC SINGLE CRYSTALS.
Report for July 59-July 60,
by R. Piontelli, L. Peraldo Bicelli, and A. La Vecchia. Feb 61, 62p.
Contract AF61 052 144, Proj. 7022, Task 73660
WADD TR60 769 Unclassified report

Descriptors: *Single crystals, *Cathodes, Hydrogen, Silver, Lead, Nickel, Tin, Cadmium, Equations, Solutions, Cathodes (Electrolytic cell), Electrolysis, Electric potential, Metals.

Hydrogen overvoltage on silver, lead, nickel, tin and cadmium single crystals was measured in different experimental conditions. The Tafel law is generally followed. (Author)

AD-403 758 Div. 4
(TISTM/EJH) OTS price $2.60

Feltman Research Labs., Picatinny Arsenal, Dover, N. J.
STUDY OF THE NITRATION OF 3,3,3-TRIFLUORO-1,2-EPOXYPROPANE,
by Yvon P. Carignan. Apr 63, 26p.
DA Proj. 5B17 06 002
PA TR3055 Unclassified report

Descriptors: *Organic compounds, *Nitration, Synthesis (Chemistry), Mixtures, Nitric acid, Sulfuric acid, Boron compounds, Fluorides, Complex compounds, Hydrolysis, Chemical reactions, Infrared spectroscopy, Organic compounds, Others.

3,3,3-Trifluoro-1,2-epoxypropane was nitrated with (1) 98% nitric acid, (2) mixed acid (H_2SO_4:HNO_3, 1:1 by wt), and (3) boron trifluoride-nitric acid complex. Each nitrating agent afforded the desired 3,3,3-trifluoro-1,2-propane dinitrate, CF_3-$CHONO_2$-CH_2ONO_2 together with variable amounts of the two mononitrates CF_3-$CHOH$-CH_2ONO_2 and CF_3-$CHONO_2$-CH_2OH. Under the conditions of the experiments, only with the boron trifluoride-nitric acid complex were reasonable yields of the dinitrate obtained. During this study, it was observed that the dinitrate was partially hydrolyzed (20%) on a silica gel column to the mononitrate CF_3-$CHOH$-CH_2ONO_2. (Author)

AD-403 777 Div. 4, 7
(TISTM/ODN) OTS price $2.60

Naval Ordnance Lab., White Oak, Md.
THE DECOMPOSITION OF ARGENTIC AND ARGENTOUS OXIDES IN CONCENTRATED KOH ELECTROLYTE,
by F. M. Bowers, R. D. Wagner, N. R. Berlat, and G. L. Cohen. Apr 63, 20p.
NOL TR62 187
Unclassified report

Descriptors: *Silver compounds, *Potassium compounds, *Batteries and components, Electrochemistry, Decomposition, Chemical reactions, X-ray diffraction analysis, Reaction kinetics, Chemical equilibrium, Thermodynamics, Test equipment, Experimental data, Gravimetric analysis, Heat, Oxides, Hydroxides, Electrolytes.

The rate of decomposition of AgO in 40% (10N) KOH electrolyte was studied at temperatures ranging from 4.4 to 71 C. No decomposition was observed at 4.4 C. After 35 days at 71 C there was complete reduction to Ag2O and metallic silver. The addition of 6.5 - 8.5% ZnO by weight decreases the rate of decomposition of AgO and possibly prevents the decomposition of Ag2O. The decomposition of Ag2O to metallic silver under the conditions studied is thermodynamically feasible. (Author)

AD-403 804 Div. 4
(TISTM/ODN) OTS price $1.10

Feltman Research Labs., Picatinny Arsenal, Dover, N. J.
DIFFERENTIAL THERMAL ANALYSIS OF POTASSIUM PERCHLORATE,
by David A. Anderson and Eli S. Freeman.
Mar 63, 12p.
DA Proj. 599 25 001
PA TR3046
Unclassified report

Descriptors: *Potassium compounds, Gravimetric analysis, Pyrolysis, Decomposition, Heat, Thermodynamics, Perchlorates.

Differentia thermal analysis and thermogravimetric analysis experiments were carried out on potassium perchlorate. The thermograms clarify conflicting reports in the literature concerning details of decomposition and elucidate the thermodynamics of this reaction. (Author)

AD-403 820 Div. 4
(TISTM/AW) OTS price $2.25

Rocketdyne, Canoga Park, Calif.
RESEARCH IN FLUORINE CHEMISTRY.
Summary rept., 16 Mar 62-15 Mar 63,
by H. H. Rogers, S. Evans, and J. H. Johnson.
30 Apr 63, 1v. R5077
Contract Nonr1818 00
Unclassified report

Descriptors: *Fluorides, Hydrogen compounds, Electrolysis, Oxides, Nitrogen compounds, Tetroxides, Driers (Apparatus), Desiccants, Polarization, Current regulators, Synthesis (Chemistry), Electrochemistry.

Contents:
Electrolyses in anhydrous hydrogen fluoride:
The drying of hydrogen fluoride by electrolysis
The hydrogen fluoride-nitrous oxide system
The hydrogen fluoride-dinitrogen tetroxide system
The hydrogen fluoride-nitric oxide system
Wide range current regulator

AD-404 033 Div. 4, 17
(TISTM/AMS) OTS price $1.60

Birmingham U. (Gt. Brit.).
THERMODYNAMICS OF ALLOYS (CALORIMETRY).
Final technical rept., 1 Dec 61-30 Nov 62,
by J. N. Pratt and A. W. H. Morris. 30 Nov 62, 16p.
Contract DA91 591EUC2029
Unclassified report

Descriptors: *Tin alloys, *Rare earth elements, *Heat of solution, Test methods, Experimental data, Cerium, Lanthanum.

AD-404 056 Div. 4, 25
(TISTM/PCR) OTS price $4.60

Battelle Memorial Inst., Geneva (Switzerland).
SOLID-STATE PROPERTIES OF NON-CONDUCTING MATERIALS OF SIMPLE MONATOMIC AND DIATOMIC SPECIES.
Final technical rept., 1 Dec 61-30 Mar 62,
by Laurens Jansen, Samson Zimering, and Michael H. Boon. 31 Jan 63, 16p.
Contract DA91 591EUC2071
Unclassified report

Descriptors: *Crystal structure, *Helium group gases, Solid state physics, Diatomic molecules, Neon, Argon, Krypton, Xenon, Helium, Mathematical analysis, Stability, Dipole moments, Molecular structure, Quadrupole moments, Crystal lattices, Crystal structure, Low temperature research.

The analysis of the problem concerning the stability of crystal structures for the heavy rare gas atoms was completed. There exists firm experimental evidence that neon, argon, krypton and xenon crystallize in the face-centered cubic (fcc) structure, whereas helium, under pressure, forms crystals of hexagonal closest packing (hcp). According to calculations based on pair-potentials, however, the hexagonal lattice should be somewhat more stable for all rare gas solids involved. (Author)

AD-404 180 Div. 4, 7
(TISTM/EJH) OTS price $8.10

Central Inst. for Industrial Research (Norway).
KINETICS OF METAL/METAL-ION ELECTRODES IN AQUEOUS SOLUTIONS.
Annual technical rept., 1 Jan-31 Dec 62,
by Tor Hurlen. 31 Dec 62, 1v. SI P370; SSR1
Contract DA91 591EUC2077
Unclassified report

Descriptors: *Electrodes, *Electrochemistry, *Reaction kinetics, Exchange reactions, Copper, Iron, Zinc, Ions, Ionization, PH, Heat of activation, Thermochemistry, Polarization, Tracer studies, Radiation chemistry, Crystal growth, Theory.

This annual technical report is a collection of the three special scientific reports made during the contract period. These three reports cover the main part of the work done under the contract and are entitled: (1) kinetics of metal/metal-ion electrodes: iron, copper, zinc; (2) anodic behaviour of iron in alkaline solutions; and (3) radiochemical studies on the Cu/Cu(2+) electrode. (Author)

AD-404 186 Div. 4, 20
(TISTM/TCG) OTS price $2.60

Leicester U. (Gt. Brit.).
NUCLEOPHILIC REACTIONS IN CARBOHYDRATE CHEMISTRY.
Final technical rept., 1 Nov 61-31 Oct 62,
by D. Murphy. 31 Oct 62, 25p.
Contract DA91 591EUC1983
Unclassified report

Descriptors: *Monosaccharides, *Sulfur compounds, *Nitrogen compounds, *Radioprotective agents, *Organic compounds, Chemical reactions, Substitution reactions, Decomposition, Reduction, Azides, Thiocyanates, Organic sulfur compounds, Ions, Hydrogenation, Hydrolysis, Chromatographic analysis, Spectra (Infrared), Catalysis, Synthesis (Chemistry), Glycosides.

Nucleophilic (N3, SCN, and RS ions) reactions were made with carbohydrate molecules. Methyl 2,3-anhydro-4,6-O-benzylidene-alpha-D-mannoside with sodium azide in boiling 2-methoxyethanol gave methyl 3-azido-4,6-O-benzylidene-3-deoxy-alpha-D-altroside. Reaction on the corresponding anhydro-alloside gave predominantly methyl 2-azido-4,6-O-benzylidene-2-deoxy-alpha-D-altroside (I) with a lesser amount of the 3-azido-3-deoxy-D-glucose isomer. All three azido sugars were characterized by reduction to the corresponding, known, amino sugars. The azido-altrosides were reduced to the corresponding amino, o-sulphonate derivatives. Various attempts were made to convert these compounds into 2,3-imino compounds. N2H4 in the presence of Raney Ni yielded methyl 4,6-O-benzylidene-2,3-dideoxy-2,3-imino-alpha-D-mannoside which was converted into the corresponding 2,3-acetimido, and 2,3-benzimido derivatives. Methyl 2,3-diazido-4,5-O-benzylidene-2,3-dideoxy-alpha-D-mannoside was prepared by direct S sub N2 replacement on the 3-sulphonate of (I). (Author)

AD-404 521 Div. 4
(TISTM/ODN) OTS price $8.10

Royal Inst. of Tech. (Sweden).
RESEARCH ON CHARACTERISTICS OF TRANSITION ELEMENTS IN SOLUTION. 1. STUDIES ON RHODIUM CHEMISTRY, WITH A NOTE ON PALLADIUM. 2. STUDIES ON RUTHENIUM CHEMISTRY,
by Clara Berecki-Biedermann, Felipe Brito and Derek C. Lewis. Feb 63, 1v.
Contract AF61 052 417
AFCRL 63 456 Unclassified report

Descriptors: *Rhodium compounds, *Palladium compounds, *Ruthenium compounds, Experimental data, Oxidation reduction reactions, Perchlorates, Sulfates, Synthesis (Chemistry), Perchloric acid, Sulfuric acid, Mathematical analysis, Hydrolysis, pH, Electrolytic cells, Absorption spectrum, Chlorides, Chemical analysis, Volumetric analysis, Electrodes, Hydroxides, Solutions.

Systematic studies were made on the preparation and characterization of halogenide-free rhodium sulfate and perchlorate solutions. Improved methods of preparation and analysis were worked out. Some redox emfs for Rh(III, V) mixtures are given. They do not correspond to real equilibrium, but the apparent standard electrode potential in 0.5 - 1 M HClO4 is around 1.42 V. Absorption spectra are given for the solution prepared. Pure palladium(II) perchlorate and sulfate solutions were prepared by precipitating first - with HClO4 hydrous palladium oxide from a clear alkaline solution of Pd(NO3)2 and then dissolving the precipitate in cold HClO4 (H2SO4). Redox reactions of Ru in 1 M H2SO4 medium were studied: The oxidation number was varied stepwise by chemical means (Ti(III), Cr(II), Ce(IV)) or coulometrically, and e was measured. The resulting curves bring out the existence of slow, irreversible reactions, and of polynuclear species of mixed oxidation number. (Author)

AD-404 571 Div. 4, 16
(TISTM/EJH) OTS price $1.60

Technische Hogeschool, Delft (Netherlands).
RESEARCH ON THE SYNTHESIS OF COMPOUNDS CONTAINING AN UNSYMMETRICAL TRIAZINE RING.
Final technical rept., 1 Jan 62-1 Jan 63,
by W. Berends. 1 Jan 63, 11p.
Contract DA91 591EUC2099
Unclassified report

Descriptors: *Organic compounds, *Nitrogen compounds, *Toxins and antitoxins, *Pharmacology, Toxicity, Molecular structure, Antibiotics, Pseudomonas, Synthesis (Chemistry).

Research is concerned with the synthesis of compounds containing an unsymmetrical triazine ring, including compounds having unsymmetrical triazine rings with different structures or with substituents in the triazine or adjacent ring such as the following: (1) an unsymmetrical triazine resembling the triazine of toxoflavin, (2) a pyrimido-as-triazine, in which the position of the rings in relation to toxoflavin is changed, (3) a pyrazolo-pyrimidine, and (4) a pyridino-as-triazine.

AD-404 572 Div. 4, 14, 30
(TISTM/EJH) OTS price $.50

Coating and Chemical Lab., Aberdeen Proving Ground, Md.
IDENTIFICATION AND DETERMINATION OF PLASTICIZERS IN LACQUERS BY PROGRAMMED TEMPERATURE GAS CHROMATOGRAPHY,
by George G. Esposito. 16 Apr 63, 13p.
DA Proj. 1HO 24401A110 05
CCL 141 Unclassified report

Descriptors: *Varnishes, *Plasticizers, *Chromatographic analysis, *Organic compounds, Nitrocellulose, Acrylic resins, Vinyl plastics, Temperature, Separation, Laboratory equipment, Coatings.

Plasticizers are important modifiers of synthetic resins and their presence will greatly influence the physical characteristics of lacquers. This report describes a procedure for the identification and determination of seven plasticizers in nitrocellulose, vinyl and acrylic type lacquers by programmed temperature gas-liquid chromatography (PTGLC). The chromatographic analysis is conducted on the sample which has been treated to remove the resins. Plasticizers are identified from their relative retention times and determined by the internal standard technique. The method is simple, rapid and accurate. (Author)

5. COMMUNICATIONS

AD-403 655 Div. 5, 19
(TISTE/CRJ) OTS price $7.60

Systems Analysis and Research Corp., Boston, Mass.
COMPARATIVE COST ANALYSIS OF MICROWAVE AND WIRE-LINE RADAR REMOTING TECHNIQUES.
Final rept.,
by John W. Drake and Robert L. Schein. Mar 63, 68p. Contract ARDS628, Proj. 151 1S 19
Unclassified report

Descriptors: *Air traffic control systems, *Microwave communication systems, *Data transmission systems, *Field wire communication systems, Radar beacons, Data, Microwave networks, Installation, Radio equipment, Data processing systems, Maintenance, Operation, Analog systems, Digital systems, Costs.

Comparison is made of the cost to the FAA, of wireline remoting of digitalized radar and beacon data (and beacon only) to Air Route Traffic Control Centers with the costs for microwave remoting of the same information in analog form. The second technique includes facilities for subsequent converting of the data to digital form at the center. The costs considered are those not yet sunk or committed, i.e., future costs. Costs for both methods alone, and for a mixed system, are developed for each of two nationwide remoting networks - that presently programmed including new links for which the FAA may be committed through F.Y. 1964, and a hypothetical network to provide radar coverage to 5,000 ft MSL or 3,000 ft above the terrain, whichever is higher. Costs are developed for each microwave repeater and terminal pair of each link, based on individual variations in terrain and hardware requirements. The investigation concludes that the difference in cost between the two transmission methods is small. Where a difference does exist it generally favors the wireline technique. In cases of extreme link length and/or very difficult terrain, wireline is considerably less costly. For the great majority of all other links, if non-cost considerations are of any appreciable importance, costs should probably not govern any ultimate decision. (Author)

AD-404 201 Div. 5, 8
(TISTE/CAM) OTS price $2.60

Aerospace Corp., Los Angeles, Calif.
SATELLITE CONTROL FACILITY EQUIPMENT AUGMENTATION. DESIGN CRITERIA, INTER-STATION COMMUNICATION SUBSYSTEM.
3 Aug 62, 1v. TOR930 2110 6 RA
Contracts AF04 647 930, and AF04 695 169
Unclassified report

Supersedes rept. no. TOR-930(2110)-6, dated Apr 62.

Descriptors: *Communication systems, *Satellites (Artificial), *Command and control systems, Tracking, Telemeter systems, Teletype systems, Voice communication systems, Data, Failure (Mechanics), Maintenance, Communication equipment, Control systems satellites (Artificial).

Design criteria are established for re-configuration of the inter-station communications equipment of the satellite control facility. The inter-station communication links defined by these criteria shall terminate in a central location for connection to the intra-station communication facilities and terminal equipment. The augmented Inter-Station Communication Subsystems shall be capable of providing the following: (a) simultaneous voice communications from two controllers at each of the augmented SCF ground stations to two controllers at the sta, and single voice channels to the other stations via sta; (b) efficient machine handling of data between each tracking station and the sta to support as many as two simultaneous passes to any one station; (c) supervisory and control message traffic for satellite support; (d) normal administrative traffic not specifically associated with satellite support; and (e) auto synchronization check unit to permit rapid resynchronization. (Author)

AD-404 202 Div. 5
(TISTE/JBM) OTS price $1.60

Radiation Inc., Melbourne, Fla.
REPEATER, TELEGRAPH TH-38 ( )/G.
Quarterly progress rept. no. 4, 1 Dec 62-1 Mar 63,
by R. D. Squires. 1 Mar 63,
Contract DA36 039sc87254, Proj. 3B21 06 001 03
Unclassified report

Descriptors: *Telegraph equipment, Tests, Vibration, Temperature, Transistors, Electrical properties, Reliability (Electronics).

Efforts were continued on the development and fabrication of Telegraph Repeater TH-38 ( )/G. Two engineering test models were assembled and successfully tested electrically. Vibration testing was performed, and unit resonance at approximately 35 cycles was detected. A mechanical redesign was begun. (Author)

AD-404 253 Div. 5, 6, 19
(TISTE/JBM) OTS price $4.60

Rome Air Development Center, Griffiss Air Force Base, N. Y.
A LOW FREQUENCY HOMING BEACON TRANSMITTER FOR PROJECT JUNGLE JIM,
by Herbert C. Thorpe. Feb 63, 18p.
Proj. 5593
RADC RAL TM63 1
Unclassified report

Descriptors: *Radio beacons, Air traffic control systems, Radio transmitters, Homing devices, Mobile, Air control centers, Medium frequency, Low frequency, Modulation, Coding, Crystal oscillators, Tuned circuits, Oscillators, Transistors, Power amplifiers, Electron tubes, Coupling circuits.

A low frequency homing beacon transmitter was fabricated for installation in the AN/MRN-15 Air Traffic Control Set. The beacon set operates in the LF frequency range from 200 kcs to 400 kcs at a power output of 100 watts, and is capable of keyed CW and voice modes of transmission. The equipment operates from a nominal 117 v, 60 cps power source with a 5 ampere consumption. (Author)

AD-404 270 Div. 5, 8
(TISTE/OHD) OTS price $1.60

Centro Radioelettrico Sperimentale G. Marconi, (Italy).
RADIOCOMMUNICATION BY BACKSCATTER.
Final technical rept.,
by I. Ranzi. 31 Dec 62, 17p.
Contract AF61 052 139
AFCRL 63 101 Unclassified report

Descriptors: *Radio communication systems, *Scattering, High frequency, Multipath transmission, Bandwidth, Railroad tracks, Transmission lines, Beaches, Ionospheric propagation.

Experiments on line-of-sight backscatter of h.f. radio waves put in evidence the high values of the backscattering coefficient, concerning the sea near the coastal boundaries, when the vertically polarized component of the radio wave is considered; it was also shown that the power lines, the railways, and the metallic structures in general are very efficient backscatters, to be considered when the h.f. backscatter occurs from a highly developed country. Another series of experiments was performed, concerning the possibility to reduce the broadening and the multipath effects in the backscattered echoes,

and to increase the bandwidth capability of a radiocommunication system by backscatter; it was shown that the echo pattern strongly depends on the antenna vertical beamwidth, and that the ionospheric irregularities producing multipath effects are of the focusing type: their occurrence notably increases with the latitude. (Author)

AD-404 376 Div. 5, 8
(TISTE/OHD) OTS price $3.60

Motorola, Inc., Chicago, Ill.
DATA TRANSMISSION INVESTIGATION.
Quarterly progress rept. no. 2, 11 Dec 62-10 Mar 63,
by R. F. Salava. 10 Mar 63, 35p. 6
Contract DA36 039sc90728, DA Proj. 3B31 07 001
Unclassified report

Descriptors: *Radio communication systems, *Data transmission systems, Digital systems, Errors, Test methods, Signal-to-noise ratio, Noise (Radio), Radio interference, Radio transmission.

The characteristics of the AN/VRC-12 are discussed and the field test system for digital data transmission using the AN/VRC-12 is presented. Seven fixed transmission sites were used for transmission points to the laboratory where the analysis of the data was conducted. Map profiles of these sites are given and the audio S/N and digital error rates measured over these transmission paths are presented. Error rates varied from 5 x 10 to the -6th power to 1 x 10 to the -3rd power depending upon the site and conditions. A table of average error rates shows that the error rate of a particular modem is almost independent of bit rate. Further analysis of the results show that single-bit errors, account for about 90% of the characters-in-error in the AN/TYC-1 and Di-phase modems for transmission at 600 bps or less and in these cases error correction codes would be very effective. The cause of the errors is found to be impulse noise and photographs of the noise plus the signal is presented for discussion. The new digital data test system is discussed with the aid of a system block diagram. Both a printed record and a punched tape record of the error characteristics is provided. (Author)

AD-404 419 Div. 5, 1
(TISTE/JWS) OTS price $4.60

Robertshaw-Fulton Controls Co., Anaheim, Calif.
''MULTILOK'' HIGH SPEED DATA MODEM. MODEL 6005.
Final engineering rept.
1 Mar 63, 1v. 909 026 019
Contract ARDS555
Unclassified report

Descriptors: *Modulators, *Data transmission systems, *Aircraft equipment, Phase modulation, Maintenance, Amplifiers, Voltage regulators, Filters (Electromagnetic wave), Limiters, Transistors, Containers, Diodes (Semiconductors), Errors.

A high-speed data modem was adapted for operation with a ground-air-ground digital communications link. The modems employ phase-shift modulation techniques with synchronized data rates up to 1200 bits per second. Solid state components are used throughout the equipment. Error rates of less than 1 in 100,000 bits were recorded for line signal-to-noise ratios of 15 db or greater. Error-free data transmission was achieved in the absence of noise over a dynamic range of 50 db on the demodulation input. (Author)

AD-404 428 Div. 5, 8
(TISTE/JWS) OTS price $2.60

Air Force Cambridge Research Labs., Bedford, Mass.
CANCELLATION OF DOPPLER FREQUENCY SHIFT,
by Richard M. Waetjen. Mar 63, 21p.
AFCRL 63 70 Unclassified report

Descriptors: *Doppler effect, *Radio communications systems, Frequency shift, Phase locked communication systems, Filters (Electromagnetic wave), Attenuation, Radio receivers, Radio transmitters.

A circuit is described which is capable of cancelling first-order Doppler frequency shifts. It has potentialities in the fields of communication, data transmission, and navigation systems for vehicles moving at high velocities. The circuit has the following features: (1) Received and transmitted frequencies at each of the stations involved are different, thus preventing feedback from the transmitting to the receiving antenna at the stations. (2) Amplification of the signals is provided at a frequency which can be chosen to have a convenient value. This factor is important in the case of microwave systems, since high-gain microwave amplifiers are much more expensive than, and not as reliable as, IF amplifiers operating at frequencies in the 1 to 300 mc range. (3) The system is capable of continuous-wave operation and simultaneous transmission and reception at each of the communicating stations. (Author)

AD-404 632 Div. 5, 8
(TISTE/OHD) OTS price $1.60

Watkins-Johnson Co., Palo Alto, Calif.
APPLIED RESEARCH ON TECHNIQUES FOR LIGHT MODULATION DETECTION.
Interim engineering rept. no. 3, 1 Jan-31 Mar 63,
by S. E. Sobottka. 31 Mar 63, 14p. W J63 610R12
Contract AF33 657 8996, Task 41533
Unclassified report

Descriptors: *Phototubes, *Light communication systems, Photocathodes, Manufacturing methods, Cesium, Silver, Electron beams, Traveling-wave tubes, Modulators.

Techniques were developed for constructing a convergent gun traveling-wave phototube. The procedure for transferring the photocathode from the fabrication vessel to the tube body has been tested and found successful. If care is taken, no loss of photosensitivity occurs during the transfer. This transfer technique greatly simplifies the construction of the phototube by eliminating the need for cathode fabrication and positioning assemblies inside the photocathode. The light modulator design and construction has been completed and tested. With 1.3 watts of input rf power at 3420 mc/sec, the modulation index is 0.1. This modulator, together with a superpressure Hg-arc light source, will be used to determine the rf characteristics of the phototubes. (Author)

6. DETECTION

AD-403 677 Div. 6, 25, 8
(TISTP/MH) OTS price $5.60

Aerospace Corp., Los Angeles, Calif.
ANALYSIS OF INTRINSIC PHOTOCONDUCTORS USED FOR

INFRARED IMAGING PURPOSES,
by A. S. Gutman. 30 Nov 62, 44p. TDR169(3128-02)TN1
Contract AF04 695 169
SSD TDR62 132

Unclassified report

Descriptors: *Infrared image tubes, Photoelectric materials, Phototubes, Signal-to-noise ratio, Infrared scanning, Frequency, Coding, Reticles, Filters.

Infrared imaging systems have been proposed in which one photocell can detect many different resolution elements of the image by novel means of scanning. In previous systems one photocell processes the information of one resolution element at any one instant of time. This paper attempts to analyze and evaluate different systems. The discussion begins with an analysis of a photoconductive cell. The reasons for the choice of photoconductive cells for infrared are discussed. The signal-to-noise ratio is derived for weak signals under the assumption that the current noise is predominant. Changes in cell dimensions and illumination patterns are investigated. The cell analysis is applied to imaging systems. Sequential scanning systems, mosaic systems, and reticle scanning with orthogonal functions are treated. (Author)

AD-403 879 Div. 6
(TISTP/JEA) OTS price $2.60

Ballistic Research Labs., Aberdeen Proving Ground, Md.
THE DOPLOC DARK SATELLITE TRACKING SYSTEM,
by A. L. G . deBey and V. W. Richard. Mar 63, 23p.
Proj. 1M222901A215
BRL 1195

Unclassified report

Descriptors: *Radar reflection, *Doppler systems, *Antisatellite defense systems, *Satellites (Artificial), Data processing systems, Orbital trajectories, Radio receivers, Error, Design, Radar tracking, Detection.

The DOPLOC dark satellite tracking system is described and tracking results are presented. DOPLOC is a radio reflection Doppler tracking system deriving its name from the Doppler frequency phase-locked tracking filter technique used. Dark, i.e. non-radiating, satellites are illuminated by a ground-based transmitter and signals reflected from illuminated satellites are received at one or more ground-based receiving sites. A method has been developed for the determination of a complete set of orbital parameters from Doppler data recorded in the course of a single pass of a satellite. Numerous orbital solutions have been obtained with Doppler data from a single receiver recorded during a single pass of a satellite. Computing times of 2 to 4 minutes are required with the BRLESC computer. The DOPLOC tracking method has general application to the tracking of projectiles, rockets, guided missiles and space vehicles. (Author)

AD-403 886 Div. 6, 8, 25
(TISTE/OHD) OTS price $1.60

Naval Research Lab., Washington, D. C.
GRAPHICAL DETERMINATION OF THE RESPONSE OF A SIMPLE LINE HYDROPHONE TO TWO SOURCES,
by C. W. Klee. 8 Mar 63, 10p.
BuShips Proj. SF011 03 02, Task 2375
BUSHIPS NRL5889

Unclassified report

Descriptors: *Hydrophone, Acoustic properties, Vector analysis, Errors, Theory, Mathematical analysis, Analytic geometry.

A graphical determination of the line hydrophone's response to two sources was made by vector addition of elemental contributions. The results then applied to the specific cases of a 3-wavelength line in the presence of (a) two equal-amplitude sources in phase and 180 degrees out of phase and (b) two sources in the amplitude ratio 1:2, in phase and 180 degrees out of phase. Plots were made for source seprations from 0 degrees to 50 degrees. It was shown that at source separations smaller than a lobe width the hydrophone becomes susceptible to a pointing error such that the direction of maximum response may be outside the angle included by the sources. This error angle becomes larger as (a) the sources' amplitude difference becomes smaller, (b) their phase difference becomes larger, or (c) their separation becomes smaller. For a line hydrophone, the error angle has a maximum that is given by a value of which can be calculated from the line length and the wavelength. This angle amounts to about 12.5 degrees for a 3-wavelength line. (Author)

AD-404 064 Div. 6
(TISTP/JEA) OTS price $8.60

General Precision, Inc., Glendale, Calif.
DEVELOPMENT OF LEAD SELENIDE DETECTOR ARRAY. VOL. II. PASSIVE DETECTION STUDY,
by J. Steranka, Jr. Apr 63, 1v.
Contract AF04 695 228
SSD TDR63 104, vol. 2 Unclassified report

Descriptors: *Detectors, *Detection, Series, Time-log theory, Noise (Radio), Distribution, Time signals, Numerical analysis, Correlation techniques, Acoustic detectors, Radar, Ultraviolet detectors, Infrared detectors, Sonar, Detection, Statistical functions, Lead compounds, Bessel functions, Selenides, Communication theory, Signal-to-noise ratios, Mathematical analysis.

The research complements present detection theory by providing a useful mathematical statement of the ideal requirements for systems endeavoring to detect time-variant stochastic signals in the presence of Gaussian noise. The a posteriori probability approach is employed to state the sufficiency conditions in general form; these are then reduced to a useful set of requirements for an ideal detection system through series representation of arbitrary signals. The results show that a detection system can only provide estimates of relevant information appearing in a signal-plus-noise quantity; inferences drawn from these estimates subsequent to detection will say something about signal present. The results clearly state, therefore, that a detection system is fundamentally an information detector, and not a detector of signals. Present detection methods are shown to be approximations to the ideal requirements developed. The ideal requirements are evolved in a form which permit possible logical improvements to present methods. Subsequent signal processing of detection system output receives some attention. Maximum likelihood is considered, as well as an approximate system model based on a particular interpretation of ''psuedo-constant signal'' detection which leads to maximum use of detected quantity. (Author)

AD-404 097 Div. 6
(TISTE/JBM) OTS price $1.10

Electronic Communications, Inc., Timonium, Md.
PROTOTYPE HIGH POWER CIRCULATOR.

Interim engineering rept. 20 Jan 62-20 Apr 63. 10 May 63, 4p.
Contract NObsr87394, Proj. SF0010205; ST6158
Unclassified report

Descriptors: *Transmission lines, *Radar transmitters, Electric fields, Coaxial cables, Limiters, Radar equipment, Power, Ferroelectric materials, Coupling circuits, Ceramic materials, Test methods, Ultrahigh frequency.

Research was continued on the development of an experimental high-power, Y-circulator for use in the UHF region. The prototype Y-circulator was completed. The circulator package was tested for high-power handling capabilities. The results of these tests are included. Although the circulator package includes a solid-state limiter, work is continuing on a ferroelectric limiter which would be useful for powers in excess of the present 'state-of-the-art' limiters. (Author)

AD-404 221 Div. 6, 8
(TISTE/JWS) OTS price $2.60

Naval Ordnance Lab., Corona, Calif.
TEST PROCEDURES IN EVALUATION OF TELEMETRY SUBCARRIER DISCRIMINATORS,
by K. L. Berns. May 63, 1v. TM73 76
Unclassified report

Descriptors: *Discriminators, Stability, Radio interference, Distortion, Noise (Radio), Recording systems, Frequency analyzers, Wave analyzers, Electric currents, Power, Telemetering receivers, Test methods.

A standard test schedule is outlined and methods of measurement are described for performance evaluation of telemetry subcarrier discriminators. A sample of the evaluation report format, designed for concise data presentation and rapid comparison of performance characteristics, is included as an appendix. The test schedule includes measurements to determine the following performance characteristics; (1) linearity, (2) instability, (3) frequency response, (4) effect of noisy subcarrier signals, (5) effect of subcarrier amplitude modulation, (6) effect of line voltage variations, (7) effect of load variations, (8) input filter selectivity, (9) output distortion, (10) output noise, and (11) packaging and operational characteristics. (Author)

AD-404 252 Div. 6
(TISTP/FEM) OTS price $4.60

Rome Air Development Center, Griffiss Air Force Base, N. Y.
PARAMETER STUDIES FOR A PASSIVE OPTICAL SURVEILLANCE SYSTEM,
by Edward E. Fowle. Mar 63, 40p.
Proj. 5535, Task 553507
RADC RAL TM63 3 Unclassified report

Descriptors: *Satellites (Artificial), *Optical scanning, *Image tubes, Camera tubes, Photons, Energy, Sources, Solar radiation, Reflection, Telescopes, Sky brightness, Illumination, Statistical distributions, Probability, Optical tracking, Detection, Noise (Radio).

Parameter studies are undertaken to provide data to assist in the design or evaluation of a passive optical surveillance system. The basic parameters involved in the system are studied by investigating four technical areas: detection requirements and scan rate, sky background, threshold probability of detection, and image tube noise. The results are displayed graphically to provide convenient means for the determination of various trade-offs during design analysis. (Author)

AD-404 264 Div. 6, 30, 18
(TISTP/JEA) OTS price $6.60

General Electric Co., Syracuse, N. Y.
AIR WEAPONS CONTROL SYSTEM 412L.
Quarterly reliability program rept. no. 9.
31 Mar 63, 62p.
Contract AF19 628 513
Unclassified report

Descriptors: *Weapon systems, *Aircraft intercept control systems, *Ground support equipment, Data processing systems, Checkout equipment, Standards, Failures (Mechanics), Simulation, Operation, Tests, Electronic equipment, Air control centers, Reliability.

AD-404 381 Div. 6, 30, 18
(TISTP/JEA) OTS price $10.10

General Electric Co., Syracuse, N. Y.
AIR WEAPONS CONTROL SYSTEM 412L.
Final rept.
7 Jan 63, 1v. AWCS SR5
Contracts AF30 635 10117 and AF19 628 513
Unclassified report

Report on Reliability Program for Category I Field Test.

Descriptors: *Aircraft intercept control systems, *Data processing systems, *Programming (Computers), Checkout equipment, Checkout procedures, Ground support equipment, Electronic equipment, Time, Measurement, Control systems, Operation, Display systems, Statistical data, Tests, Weapon systems, Air control centers, Reliability, Failure (Mechanics).

AD-404 455 Div. 6
(TISTP/JEA) OTS price $8.10

Armour Research Foundation, Chicago, Ill.
EVALUATION AND IMPROVEMENT OF RADAR BEACON SYSTEMS.
Quarterly progress rept. no. 2, 1 Sep-30 Nov 62,
by J. Feldman, S. Kazel, R. Standley, and P. Toulios. 30 Nov 62, 67p.
Contract DA36 039sc90693, Proj. 3C16 19 001
Unclassified report

Descriptors: *Radar beacons, *Tunnel diodes, Doppler effect, C band, Impedance matching, Frequency multipliers, Errors, Mathematical analysis, Sensitivity, Doppler radar, Microwave oscillators, Analysis, Microwave amplifiers, Detection.

The results of a partial literature survey on tunnel diode amplifiers are presented. The gap existing between the analytical work and practical design is discussed. Limitations of presently available synthesis techniques are pointed out along with the practical problems which these limitations impose. Results on an experimental C-band amplifier are presented. Sensitivity data on a commercial available backward diode are also presented. The anticipated performance of a proposed high power harmonic generation system is discussed. Preliminary analysis of a varactor tunable tunnel diode oscillator is presented.

Results of additional theoretical work on the coherent Doppler radar are briefly discussed. (Author)

AD-404 584 Div. 6
(TISTP/JEA) OTS price $1.60

Army Missile Command, Redstone Arsenal, Huntsville, Ala.
PRELIMINARY EVALUATION OF THE MINI-BALL TARGET SYSTEM,
by Dorwin L. Kilbourn. 11 Mar 63, 19p.
AMC RE TR62 6 Unclassified report

Descriptors: *Radar transmitters, *Calibration, *Radar echo areas, *Spheres, Radar receivers, Radar reflections, Radar targets, Scattering, Test methods, Steel, Range tables, Lead, Gun-launched, Guided missiles.

Research was concerned with the work done to date on the use of metal spheres as targets for guided missile radar systems. These spheres were fired from a tripod-mounted shotgun. Results were given of the tests made on the properties and use of this device, which was named the mini-ball target system. (Author)

AD-404 648 Div. 6, 30
(TISTE/JWS) OTS price $8.10

Boeing Co., Seattle, Wash.
SPECIFICATION FOR AIRBORNE FM/FM TELEMETRY SYSTEMS,
by Rick Urban. 1959, rev. 30 Apr 63, 64p. D10 20403
Unclassified report

Descriptors: *Telemeter systems, Guided missiles (Surface-to-surface), Oscillators, Mixers (Electronic), Radiofrequency amplifiers, Voltage regulators, Power supplies, Airborne, Frequency modulation, Specifications.

7. ELECTRICAL EQUIPMENT

AD-403 536 Div. 7
(TISTE/OHD) OTS price $7.60

Marks Polarized Corp., Whitestone, N. Y.
THE CONVERSION OF HEAT TO ELECTRICAL POWER BY MEANS OF A CHARGED AEROSOL.
Final rept., 1 Feb 62-4 Aug 62.
22 Apr 63, 39p.
Contract NOw62 0644
Unclassified report

Descriptors: *Electric power production, *Energy conversion, Effectiveness, Nozzles, Air, Gas flow, Electric fields, Theory, Condensation, Aerosols, Charged particles.

A new process called the condensation aerosol method for the production of small, charged aerosol particles has been developed for use in the electrohydrodynamic energy conversion process. Using this concept, several generators may be placed in series, each one using the same vapor for aerosol formation as the previous unit. Power densities as high as 30 watts/sq. cm. of nozzle throat area have been obtained with a single stage condensation aerosol type EHD generator. Studies of the aerodynamic behavior of the EHD generator with and without energy extraction were made on a fully instrumented test bench. Measurements of the overall efficiency of the generator including frictional losses were made and are reported herein. The kinetic to electric power conversion efficiency of the generator itself was as high as eighty-five percent. Efforts were made toward designing and building a closed loop system for the generator. A small compressor system for circulating a gas in a closed loop was tested. Calculations were made for the design of a small boiler system for operating a closed loop steam cycle at a few atmospheres pressure. (Author)

AD-403 819 Div. 7
(TISTE/CRJ) OTS price $1.10

Marine Corps Landing Force Development Center, Quantico, Va.
FIELD POWER DISTRIBUTION AND LIGHTING SYSTEM FOR AOP's.
Final rept.
10 May 63, 4p.
Proj. 44 61 15
Unclassified report

Descriptors: *Shelters, *Lighting equipment, *Power equipment, Marine Corps, Portable, Reflectors, Illumination.

The power distribution system was evaluated and the lighting requirements were determined for the shelters used by the Atomic Ordnance Platoons. It was concluded that (1) the power distribution system is suitable for Marine Corps use by AOP's; (2) each AOP requires two complete power distribution systems; (3) the wiring harness is suitable for use by AOP's in the medium shelter; and (4) the wiring harness is considered flexible enough to meet the basic illumination requirements of the medium shelter for general use. (Author)

AD-403 822 Div. 7, 16
(TISTM/PCR) OTS price $3.60

Research and Development Labs., Magna Corp., Anaheim, Calif.
BIOCHEMICAL FUEL CELLS.
Quarterly progress rept. no. 2, 1 Oct-31 Dec 62,
by J. Brake and W. Momyer. 31 Dec 62, 1v.
Contract DA36 039sc90866, Task 3A99 09 001 01
Unclassified report

Descriptors: *Fuel cells, Power supplies, Bacteria, Bacterial extracts, Coatings, Electrochemistry, Physiology, pH, Temperature, Urease, Escherichia, Bacillaceae, Electric currents, Electric potential, Oxidoreductases, Ammonium compounds, Carbonates, Amino acids, Biochemistry.

Investigation of the cultural and physiological behavior of the five biochemical systems previously selected for study was completed. The effects of pH and temperature on the activity of urease, cell-free extracts of E. coli and B. pasteurii are reported. Current-potential data for all five biochemical systems (glucose-Cl. butyricum, glucose-cell-free extracts of E. coli, urea-urease, urea-B. pasteurii, leucine-L-amino acid oxidase) are included. Studies were initiated on the electrochemical behavior of the biochemical reaction products, independent of the biological phase, for those systems where the products are isolable. Anodic current-potential

curves of the urea hydrolysis product, ammonium carbonate, were obtained as a function of ammonium carbonate concentration and as a function of ionic strength of the anolyte. A simple method of improving biological electrode performance by physically confining the biological phase at the surface of the electron carrier is discussed. Some preliminary current-potential data are reported on the urea-B. pasteurii system using this method. (Author)

AD-403 869 Div. 7, 30
(TISTP/WH) OTS price $.50

Naval Research Lab., Washington, D. C.
A MODIFICATION OF THE IONIZATION METHOD ESPECIALLY SUITABLE FOR CONTINUOUSLY RECORDING CONTACT POTENTIAL DIFFERENCES,
by K. Bewig. 11 Apr 63, 6p.
NRL 5915

Unclassified report

Descriptors: *Voltmeter, *Ions, *Electrical properties, Electric potential, Work function, Electric fields, Measurement.

Ions formed in the air space between two different conducting surfaces will migrate in the electric field and produce a current in an external circuit proportional to the contact potential difference. Since the ionization method of measuring contact potential involves a direct-current output, it is more adaptable for continuous recording than are other methods, such as the vibrating condenser method. A study was made of the factors which minimize the inherent errors of the ionization method and of a modification which permits the use of an ordinary low-impedance-input dc chart-type voltmeter and the use of a wide air spacing desirable for certain applications. The modification is an accounting for errors introduced by a wide spacing between the ionizing source and the surface being studied, the wide spacing causing the air-space impedance to be comparable to the impedance of the indicating meter. (Author)

AD-403 890 Div. 7
(TISTE/CAM) OTS price $2.25

Union Carbide Consumer Products Co., Cleveland, Ohio.
CARBON ELECTRODE FUEL CELL.
Interim rept., Apr 61-Dec 62.
Mar 63, 92p.
Contract AF33 616 7256, Proj. 8173, Task 817303
ASD TDR62 1044

Unclassified report

Report on Energy Conversion Technology.

Descriptors: *Fuel cells, *Electric power production, *Electrodes, Design, Electrolytes, Automatic, Batteries and components, Power, Tables, Operation, Effectiveness, Water, Evaporation, Test methods, Space environmental conditions, Carbon.

Experimental studies have been conducted on methods of water removal in space, problems of zero-gravity operation, improved construction materials and techniques and improvement of auxiliary components. Based on these studies, a 500 watt net electrical output fuel cell battery has been assembled and tested. The battery was assembled from 4 - 140 watt modules with necessary auxiliaries and controls for fully automatic operation. The complete system was operated for 25 days continuous operation, with testing of individual modules extending from 735 hours to 2830 hours. The gross power of the 500 watt battery was 535 watts initially and e20 watts after 720 hours. Auxiliary power requirements varied from 34 watts to 28 watts. Gross thermal efficiency (based on the high heat of combustion of hydrogen) for the system varied from 55.3 per cent initially to 51 per cent at 720 hours. Results of the experimental program are applied to the conceptual design of a flyable fuel cell power system. (Author)

AD-403 935 Div. 7, 20
(TISTE/OHD) OTS price $4.60

Martin-Marietta Corp., Baltimore, Md.
NUCLEAR FUEL (OXIDE) CLAD THERMIONIC CONVERTERS.
Quarterly technical progress rept. no. 2, 1 Feb-30 Apr 63.
15 May 63, 35p. 2945 2
Contract AF33 657 10077, Proj. 8173, Task 817305 20

Unclassified report

Descriptors: *Thermionic converters, Thermionic emission, Diodes, Uranium compounds, Molybdenum, Metal coatings, Reactor fuels, Reactor cores, Reactor fuel cladding, Thermal conductivity, Resistance (Electrical), Dioxides, Nuclear power plants.

The engineering design of the double-diode thermionic converter was modified to incorporate a revised intermodule lead configuration. This new lead design promises to reduce the extent of back emission observed in the operation of double-diode devices. Manufacturing of the fueled-emitter components was completed. Fabrication of the remaining converter components is virtually complete. Fabrication of the fuel pellets to be subjected to the thermal endurance test was completed and a pre-test examination performed. The vacuum emission test using a fuel pellet similar to the fueled emitters was conducted. (Author)

AD-404 037 Div. 7
(TISTM/AW) OTS price $2.60

Melpar Inc., Falls Church, Va.
A THIN-PLATE BATTERY.
Supplement to quarterly rept. no. 12, 15 Feb-15 May 63,
by J. Smit, H. Titus, and R. T. Foley. 15 May 63, 21p.
Contract NOw60 0362c

Unclassified report

Report on Molecular Circuit Development.

Descriptors: *Primary cells, Encapsulation, Multiple operation, Electrodes, Magnesium, Stainless steel, Liquefied gases, Disks, Ammonia.

The objective of this program is the realization of a practical, reserve-type primary battery based on the NOLC liquid-ammonia activated cell. Theoretically, the active constituents of the NOLC liquid-ammonia activated cell have the capability of meeting the energy requirements. The solvent for the system, liquid ammonia, fulfills the temperature requirement. The investigation of single-cell characteristics has demonstrated the practicability of utilizing the NOLC cell at high-drain rates. However, the transition from a single-cell unit to a multicell device is accompanied by many difficulties of a practical nature. It is the immediate goal of the program to accomplish this transition.

Division 7 - ELECTRICAL EQUIPMENT

During this report period, several encapsulated devices were fabricated and evaluated. Additionally, a new multi-cell test fixture was designed and constructed. (Author)

AD-404 062 Div. 7, 8, 17
(TISTE/OHD) OTS price $10.10

Westinghouse Electric Corp., Pittsburgh, Pa.
THERMOELECTRICITY.
Quarterly progress rept. no. 1, Jan-Apr 62.
Apr 62, 1v.
Contract NObs86595

Unclassified report

Descriptors: *Thermoelectricity, Mechanical properties, Electrical properties, Germanium compounds, Tellurides, Tellurium alloys, Silver compounds, Antimony compounds, Antimony alloys, Cobalt alloys, Selenides, Indium alloys, Indium compounds, Bismuth alloys, Powder alloys, Electric terminals, Lead compounds, Tin, Temperature, Deformation, Alloys.

Contents:
Materials development
Ge-Ag-Sb-Te alloys
CoSb(3-x-y)Te(x)Se(y) alloys
Sb-In-Te alloys
Contacting
A processing technique for bismuth doped lead-telluride thermoelectric alloys
The effects of heavy deformation and annealing on the electrical properties of Bi(2)Te(3)
The thermoelectric properties of CoSb(3)
Non-stoichiometry in some group IV tellurides

AD-404 193 Div. 7, 17, 26
(TISTE/JBM) OTS price $7.60

Tyco Inc., Waltham, Mass.
POWER DEFENSE THERMOELECTRIC MODULE.
Interim rept., 3 July 61-2 Nov 62.
ed. by Martin Weinstein. 2 Nov 62, 65p.
Contract NObs86015.

Unclassified report

Descriptors: *Thermoelectricity, *Generators, Mechanical properties, Lead alloys, Tellurium alloys, Bonding, Ultrasonic radiation, Temperature, Thermocouples, Resistance (Electrical), Diffusion, Fixed contacts, Metallurgy, Electrodes, Iron, Oxidation, Chemical milling, Weight, High temperature research, Electric potential, Power, Sodium, Manufacturing methods, Processing, High pressure research, Thermal conductivity, Extrusion, Sintering, Effectiveness.

Efforts concerned optimizing the power-to-weight ratio of a lead telluride thermoelectric generator by developing bonding techniques and material preparation processes. A technique which utilizes a SnTe braze, was developed for bonding P and N-type PbTe to pure Fe electrodes. Contact resistances fall in the range of 5 - 15 micro-ohm per sq. cm. A bonding technique involving the interdiffusion of Fe and N-type PbTe at 850 C was developed. Contact resistances fall in the range of 10 - 20 micro ohm per sq. cm. N-type PbTe directionally solidified under the influence of ultrasonic oscillations was found to possess mechanical properties superior to presently available material. Bonded and unbonded PbTe were found to be capable of sustaining, without any visible damage, a temperature gradient of 510 C for over 250 hours. (Author)

AD-404 255 Div. 7
(TISTE/JWS) OTS price $2.60

General Electric, Schenectady, N. Y.
THERMIONIC CONVERTER SURFACE CONDITIONS.
Quarterly technical progress rept. no. 1, 15 Feb-30 Apr 63,
by V. C. Wilson and J. Lawrence. 30 Apr 63, 12p.
Contract AF33 657 10132, Proj. 8173, Task 817305 27

Unclassified report

Descriptors: *Thermionic converters, Molybdenum, Niobium compounds, Carbides, Tungsten, Tests, Temperature, Anodes, Cathodes, Surface properties, Cesium.

A short review of the program of work is given. A parallel-plane cesium converter having an emitter of niobium carbide and a collector of molybdenum was operated. Comparison is made between its operation and that of a similar converter having a cathode of polycrystalline tungsten. The power output of the niobium-carbide converter is considerably lower than with tungsten. (Author)

AD-404 273 Div. 7
(TISTM/BRW) OTS price $2.60

Westinghouse Electric Corp., Lima, Ohio.
DEVELOPMENT OF HIGH TEMPERATURE ALKALI METAL RESISTANT INSULATED WIRE.
Quarterly progress rept. no. 1,
15 May 63, 17p.
Contract AF33 657 10701, Proj. 8128, Task 8128 08

Unclassified report

Descriptors: *Liquid metals, *Corrosion, *Alkali metals, High temperature research, Nuclear reactors, Mercury, Potassium, Ceramic coatings, Copper, Silber, Grain structure, Copper alloys, Zirconium alloys, Oxides, Beryllium compounds, Thorium compounds, Metal coatings, Nickel, Stainless steel, Cladding, Tantalum, Nickel alloys, Aluminum compounds, Magnesium compounds, Chromium, Test methods, Coatings, Electric insulation.

The program effort is directed toward the development of an insulated electrical conductor resistant to saturated potassium (850 C) and mercury (538 C) vapors. Surveys of candidate insulators, conductors and coating methods are substantially completed. Exposure of a number of candidate insulators, uninsulated conductors, and metal-ceramic seals in potassium and mercury vapor were initiated to provide preliminary corrosion data. The mercury vapor exposure tests are completed. Evaluation of a number of coating methods were initiated and preliminary results from the work are promising. (Author)

AD-404 294 Div. 7
(TISTM/EJH) OTS price $3.60

Little, Arthur D., Inc., Cambridge, Mass.
LOW TEMPERATURE OPERATION OF BATTERIES.
Quarterly rept. no. 3, 15 Nov 62-14 Feb 63,
by R. A. Horne and I. A. Black. 14 Feb 63, 35p.
Contract DA36 039sc90706, Proj. 3A99 09 002 02

Unclassified report

Descriptors: *Batteries and components, *Power supplies, *Thermal insulation, *Low temperature batteries, Storage batteries, Primary cells, Specific heat, Thermal diffusion, Cooling, Low temperature research, Heaters, Materials, Glass, Paper, Experimental data, Temperature control.

Reported values for watt-hr/lb, cu in./lb, and $/lb were assembled for primary and secondary batteries for the temperature range +70 F to -65 F. The specific heat and thermal diffusivity of the BA-270/U battery was measured. The heat leak through electrical leads was analyzed. A computer program was prepared for calculating the time-temperature history of battery-heater-insulation systems. (Author)

AD-404 628 Div. 7, 25
(TISTM/AW) OTS price $1.60

Calvin Coll., Grand Rapids, Mich.
SILVER MIGRATION AND TRANSPORT MECHANISM STUDIES.
Quarterly technical progress rept. no. 4, 1 Feb-1 May 63,
by T. P. Dirkse and L. A. Vander Lugt. 1 May 63, 9p.
Contract AF33 657 8689, Proj. 3145, Task 61079 16
Unclassified report

Descriptors: *Alkaline cells, Electrolytes, Silver, Transport properties, Electrodes, Cadmium, Radioactive isotopes, Silver compounds, Oxides, Zinc, Tracer studies.

A cell was constructed in which it is possible to follow the radioactivity of the electrolyte of a silver-cadmium-alkaline cell. The cell was cycled under various conditions, using a radioactive silver electrode. An attempt is made to relate the appearance of silver in the electrolyte with various parts of the charge-discharge cycle. (Author)

AD-404 661 Div. 7
(TISTM/LMH) OTS price $8.60

Allis-Chalmers Mfg. Co., Milwaukee, Wis.
DESIGN OF HYDROGEN-OXYGEN CAPILLARY TYPE FUEL CELL.
Quarterly technical progress rept. no. 4, 1 Feb-30 Apr 63.
15 May 63, 1v.
Contract AF33 657 8970, Proj. 8173, Task 817303
Unclassified report

Descriptors: *Fuel cells, *Power supplies, Acceleration, Thermal stresses, Shock resistance, Pressure, Capillary tubes, Packaged circuits, Design, Electric power production.

This work was concerned with the performance of the fuel cell package and its various components under different environmental conditions such as shock, vibration, acceleration, etc. Thermal management studies were made on the fuel cell package to determine the optimum surface finish for orbital temperature control. Thermal studies were also conducted to establish the pre-launch heating requirements. (Author)

8. ELECTRONICS AND ELECTRONIC EQUIPMENT

AD-403 521 Div. 8
(TISTP/MH) OTS price $2.60

Rome Air Development Center, Griffiss Air Force Base, N. Y.
A NEW LOOK AT FRESNEL REGION PHENOMENA,
by Benjamin Lindeman. Oct 62, 23p.
Proj. 4540
RADC RAU TM62 6 Unclassified report

Descriptors: *Antennas, *Antenna radiation patterns, Electromagnetic waves, Antenna configurations.

The optimum utilization of the electromagnetic spectrum is a serious problem to designers of military systems and equipments. In general, radiation of electromagnetic energy is implied and the spatial patterns of radiating antennas become significant. Due to the phenomena of parallax, it becomes necessary to distinguish between the Far Field, where the pattern shape is independent of the distance from the radiating antenna, and the Fresnel Region, where the pattern shape is not independent of this distance. The subject of this report is a short intuitive discussion of the basic phenomena of signal radiation in the Fresnel Region, and the criteria associated with the establishment of a boundary between the two regions. A knowledge of the phenomena is mandatory for workers in the field of compatibility prediction, measurement and achievement. (Author)

AD-403 644 Div. 8, 25
(TISTE/OHD) OTS price $12.00

Electron Physics Lab., U. of Michigan, Ann Arbor.
APPLIED RESEARCH IN MICROWAVE AND QUANTUM ELECTRONICS.
Interim scientific rept. no. 2, 5 Aug 62-5 Feb 63,
by J. E. Boers, H. K. Detweiler, G. I. Haddad, G. Hok and G. T. Konrad. Feb 63, 150p. Rept. no. 05000 4S
Contract AF33 657 8050, Proj. 4856, Task 415603
Unclassified report

Descriptors: *Microwave amplifiers, *Plasma physics, *Noise (Radio), Helixes, Beryllium compounds, Oxides, Electron tube parts, Cesium electron tubes, Field theory, Millimeter waves, X band, Cerenkov radiation, Electromagnetic waves, Digital computers, Brazing, Titanium, Copper, Mathematical analysis, Masers, Electron guns.

This report summarizes the work done to date on the general program of applied research in microwave and quantum electronics. All the investigations carried out are directed toward extending the state of the art in microwave and quantum electronics. The research is theoretical as well as experimental in nature. The theoretical work is largely devoted to an investigation of low-noise phenomena and beam-plasma interactions. The experimental work is concerned with electromagnetic generation, particularly in the short wavelength regions. This includes several plasma devices, masers, and a Cerenkov radiation device. In addition crossed-field electron guns and high-thermal-conductivity dielectric materials for high-average-power microwave tubes are studied from a theoretical as well as experimental point of view. (Author)

AD-403 647 Div. 8
(TISTE/JWS) OTS price $3.60

Laboratories for Research and Development, Franklin, Inst., Philadelphia, Pa.
HERO SUPPORTING STUDIES.
Monthly progress rept. 1 Dec-31 Dec 62,
by Norman P. Faunce and Paul F. Mohrbach.
31 Dec 62, 27p. P B1980 6
Contract N178 8102
Unclassified report

Descriptors: *Transformers, *Waveguides, Attenuation, Power, Frequency, Low pass filters, Temperature, Standing wave ratios, Transmission lines, Low frequency, Measurement.

Two prototype low band pass transformers (LBT's) developed by Weston Instruments were examined to find the terminated power loss, at low frequency and low power. With a one-ohm termination both gave greater than 40 db power loss in the 20 Kc to 1 Mc frequency range. The losses at 1 and 10 Gc are determined, and appear to be greater than 40 db. At these two higher frequencies, 10 watts of power were applied, and the temperature rise over a 30 minute interval was noted. Temperatures do not exceed 100 C degrees for one unit, and 80 degrees C for the other. From these data, unit number 58 A appears more desirable. Power loss at 30 and 250 Mc are to be determined, and if input power can be raised to 5 or 10 watts we shall determine the temperature rise as well. On the basis of these data Weston will freeze their design, and prepare to develop final production models. These should be available for tests in early March at the latest. A theoretical development was initiated to substantiate the large losses indicated for a supposedly lossless line by the results obtained with the voltage min-max method of power measurement. This analysis supported the experimental results and once more indicated that low loss line can become quite lossy when large standing waves occur on it. In preparation for a high frequency evaluation of the protected MARK 7 MOD 0 ignition element we have investigated the voltage min-max power measuring technique adapted to waveguide. (Author)

AD-403 648 Div. 8
(TISTE/JWS) OTS price $3.60

Clevite Corp., Cleveland, Ohio.
NEW CONCEPTS FOR SOLID STATE MICROWAVE GENERATORS.
Quarterly rept. no. 1, 1 Oct-31 Dec 62,
by R. M. Scarlett. 31 Dec 62, 32p.
Contract DA36 039AMC00001, Proj. DA3A99 001
Unclassified report

Descriptors: *Diodes (Semiconductor), *Negative resistance circuits, *Radiofrequency generators, Power, Diffusion, Silicon, Mathematical prediction, Boron, Electrical conductance, Time, Microwave frequency.

The basic theory of transit-time delay diodes is presented, and their maximum power output calculated. This output is about 13% of that calculated for conventional transistors on a similar basis, but the maximum operating frequency should be much higher. It is shown how the maximum voltage decreases with frequency, leading to a lower impedance level. Experimental devices designed to make use of delay in the collector depletion layer did not show negative resistance because of difficulty in operating at the re-

quired voltage. The reverse recovery of a PIN diode is calculated and shown to be useful for harmonic generator applications. The transition time from on to off is determined by the transit time for carriers across the I region in space-charge limited flow, and by the diode capacitance. Experimental epitaxial diodes showed the expected performance of less than 1 ns turn-off time in a diode with 15 pf capacitance. (Author)

AD-403 654 Div. 8, 25
(TISTE/OHD) OTS price $10.10

Hewlett-Packard Co., Palo Alto, Calif.
ADVANCED FUNCTIONAL ELECTRONIC BLOCK DEVELOPMENT.
Interim engineering rept. no. 2, 1 Dec 62-28 Feb 63.
28 Feb 63, 119p.
Contract AF33 657 9772
Unclassified report

Descriptors: *Molecular electronics, *Solid state physics, *Semiconductor devices, Antimony compounds, Sulfur compounds, Iodides, Optical properties, Absorption, Ferroelectricity, Photoelectric cells (Semiconductor), Lead compounds, Sulfides, Sensitivity, Gallium compounds, Arsenides, Copper, Cadmium compounds, Diodes (Semiconductor), Photons, Phonons, Phosphides, Boron, Power supplies, Spectrophotometers, Test equipment, Cryogenics, Glass, Crystal structure, Electroluminescence.

The continued exploration of optical, structural and ferroelectric properties of SbSI is described. A comparison of reported values of the shift of optical absorption edge with electric field in several materials brought out that this effect is at least an order of magnitude larger in SbSI than in any other material. Two distinct families of npn planar silicon phototransistors were developed. One with gain beta of 80-120 and the other of 600-800. The photoelectric collection efficiency is highly uniform over the exposed base and is approximately 50%. The speed of response of the phototransistors is a function of light intensity, collector capacitance and gain, and emitter capacitance. Experimentation continued on injection electroluminescence and is further subdivided in sections on zinc diffused GaAs pn junctions, n on p GaAs alloyed junctions, GaAs-CdS pn heterojunctions and BP luminescence. Two studies have been carried out on zinc diffused GaAs junctions. The first deals with effect of Cu on electroluminescence in GaAs. The second concerns fine structure in Edge Electroluminescence spectra. (Author)

AD-403 684 Div. 8
(TISTP/MH) OTS price $1.10

Westinghouse Electric Corp., Pittsburgh, Pa.
APPLIED RESEARCH ON SEC AMPLIFICATION CAMERA TUBE.
Interim engineering rept. no. 1, 1 Dec 62-1 Mar 63,
by G. W. Goetze. 22 Apr 63, 4p. RR63 912 255R5
Contract AF33 657 9190
Unclassified report

Descriptors: *Camera tubes, Secondary emission, Thermionic emission, Electron bombardment, Electrons, Excitation, Photoconductivity, Cathodes.

A new type of storage target for use in camera tubes was developed. This target is based on the principle of secondary electron emission and secondary electron conduction of a low-density deposit of an insulator or semiconductor under excitation of KeV electrons. This target is referred to as SEC-target. The design, fabrication and preliminary evaluation of the first three, out of eight, SEC-Vidicons are described. (Author)

AD-403 690 Div. 8
(TISTE/OHD) OTS price $19.75

Westinghouse Electric Corp., Baltimore, Md.
STUDY OF FAILURE MECHANISMS.
Final rept., 1 July 61-30 Sep 62,
by S. M. Skinner and J. W. Dzimianski. Dec 62, 288p.
Contract AF30 602 2558, Proj. 5519, Task 45155
RADC TDR63 30 Unclassified report

Report on Study of Failure Mechanisms.

Descriptors: *Semiconductors, *Reliability (Electronics), Surface properties, Malfunctions, Statistical analysis, Test equipment (Electronics), Aging (Materials), Chemical milling, Temperature, Mathematical analysis.

Various approaches to the study of properties of semiconductor surfaces are taken up, in particular, the very sensitive electrical-frictional probe which is applied to the study of defects and processing technology under various conditions. The distribution of failures in the manufacturing and testing phase of two military systems are compared, and the factors described which caused failure ratios in the one to be one-seventh those in the other. By various studies, it has been determined that the aging of a semiconductor surface does not take place uniformly, but occurs differently at different regions on the surface. The effect of different types of etching and processing solutions on the photovoltaic response of the surface at individual points is used to investigate the nature of the aging and chemical changes on the surface. Characteristic changes in transistor performance have been demonstrated from the charging of passivating layers by electrons or ions, from the frictional effects of loose desiccant under vibration, from ultraviolet light, and from steep transients in the non-overload range. In all cases, recovery occurs by a relaxation mechanism, which, if translated to the manufacturer's carefully planned ambient environment, involves time constants often of days or months. (Author)

AD-403 706 Div. 8, 30
(TISTP/MFA) OTS price $3.60

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
DUAL MODE CONTROL,
by Leonidas M. Mantgiaris. 26 Dec 62, 25p.
1104 62
Grant DA ARO(D)31 124G144
Unclassified report

Descriptors: *Control systems, Chemicals, Tanks (Containers), Mixtures, Functions, Feedback, Analog computers, Switching circuits, Transients, Analysis, Processing.

A simple compensation scheme for the control of a process is presented. The criteria are that the process output closely approximate the process input when the latter is a step and that there be no steady state error. The reference process chosen is that of chemical concentration control. Employing a compensation block with pure gain gives a fast response that has a steady-state error. Integral compensation eliminates the steady-state error, but its response has a very sluggish transient character. A switching arrangement is evolved that combines the desirable characteristics of both types of compensations while removing the unwanted traits. This configuration is set up on an analog computer and compound results which satisfy the original criteria are empirically obtained for a plant of three poles. This is done for plants of two poles and one pole with equal success, exhibiting the validity of the technique for a general plant. (Author)

AD-403 722 Div. 8, 7
(TISTE/PAR) OTS price $1.60

Boeing Scientific Research Labs., Seattle, Wash.
THE CUMULATIVE EFFECT OF RANDOM LOSSES IN A TRANSMISSION LINE,
by George Marsaglia. Feb 63, 13p. MN289; D1 82 0236

Unclassified report

Also available from the author.

Descriptors: *Transmission lines, *Wave transmission, Standing wave ratio, Admittance, Probability, Microwaves, Measure theory, Statistical functions, Reflection.

A study was made of the probability distribution of losses from reflections at discontinuities in a transmission line, on the assumption that the reflection coefficients at the discontinuities have random phase, and, in addition, random magnitudes associated with manufacturing uncertainties (tolerances). (Author)

AD-403 756 Div. 8
(TISTE/JWS) OTS price $2.60

Army Electronics Research and Development Agency, Fort Monmouth, N. J.
A METHOD OF BASIC TEMPERATURE COMPENSATION IN TRANSISTORS,
by Richard L. Brayden. Feb 63, 21p.
DA Task 3A99 21 003 01
AELRDL TR2311

Unclassified report

Descriptors: *Transistors, Temperature sensitive elements, Diodes (Semiconductor), Temperature control, Silicon, Electric currents, Mathematical analysis, Recombination reactions, Transport properties, Temperature.

A semiconductor device complex, consisting of a diode-transistor combination, that effectively compensates for normal transistor gain variations as a function of temperature has been developed. This device has the characteristics of the normal transistor, except that in the range of 0 C to 70 C the hFE changes by less than 10%. The complex circuit-wise as if it were an ordinary NPN silicon transistor. In this report a direct comparison is made between the new device and an electronically similar commercially available transistor. In addition, a simple technique called m-slope analysis is presented that gives a method of pinpointing the dominant leakage effects in both planar and mesa transistors and to what extent these effects occur. (Author)

AD-403 781 Div. 8
(TISTE/JBM) OTS price $1.60

Airborne Instruments Lab. Inc., Deer Park, N. Y.
LOW-NOISE SMALL-SIGNAL AMPLIFIER.
Interim rept. 3, 26 Jan-27 Apr 63.
by D. Neuf and P. Lombardo. 27 Apr 63, 7p.
Contract NObsr87556

Unclassified report

Descriptors: *Varactor diodes, *Parametric amplifiers, Superhigh frequency, Ultrahigh frequency, Noise (Radio), Gain, Bandwidth, S band, Tuned amplifier, Packaged circuits, Attenuators, Resonators, Tuned circuits.

Research was continued on the development of a low noise, small signal, varactor diode parametric amplifier operating over a range of 2 to 4 gc. Two single-diode varactor mounts, each having a 40-percent instantaneous bandwidth, were cascaded to yield an overall gain of 10 db from 2 to 3 gc (3-db points). The noise factor of these combined amplifiers varied linearly from 1.8 db at 2 gc, to 3 db at 2.8 gc. The noise factor above 2.9 gc peaked very sharply to about 5.5 db. The reason for this peak is not yet apparent. The configuration of the final engineering model was fixed--four stages will be used and the package will accommodate either the balanced or unbalanced varactor mount. (Author)

AD-403 782 Div. 8
(TISTE/JBM) OTS price $5.60

Airborne Instruments Lab., Inc., Deer Park, N. Y.
FEASIBILITY INVESTIGATION OF DOUBLE-CONVERSION PARAMETRIC AMPLIFIER OPERATING FROM 1 TO 4 GC.
Quarterly rept. no. 1, 1 Oct-31 Dec 62,
by J. J. Whelehan and A. J. Anselmo. Jan 63, 1v. 2595I1
Contract DA36 039sc AMC00063, Proj. 2Z44 02 001

Unclassified report

Descriptors: *Parametric amplifiers, *Tuned amplifiers, *Diodes (Semiconductors), Bandwidth, Programming (Computer), Noise (Radio), Broadband, Frequency converters, Modulation, Arsenic alloys, Gallium alloys, Packaged circuits, Waveguides, Capacitance, Electrical impedance, Ultrahigh frequency, Superhigh frequency, K band, Tuned circuits.

Research concerns the determination of the feasibility of building a double-conversion parametric amplifier to operate from 1 to 4 Gc with a minimum gain of 10 db. A theoretical analysis of the gain and bandwidth performance of a single-tuned sum-frequency reactance amplifier was made. In order to obtain results that would be valid over the wide band of interest, it was necessary to use a computer program to compute the performance. The relative gain as a function of frequency for four different loading conditions was computed. These results showed that the best compromise between gain and bandwidth would result in a mid-band gain of e.75 db and a 3 db bandwidth of 2025 Mc. In addition to the single-tuned analysis, a practical technique for double-tuning a sum-frequency amplifier is discussed. A static and dynamic evaluation of presently available diodes was conducted to determine which diode would give the minimum noise figure and maximum bandwidth in a K-band parametric amplifier. The dynamic characteristics were checked by operating a degenerate amplifier at 17.5 Gc. (Author)

AD-403 791 Div. 8
(TISTP/JEA) OTS price $1.60

Naval Ordnance Lab., White Oak, Md.
GENERAL PERFORMANCE AND DESIGN OBJECTIVES FOR FIELD TEST SETS,
by John R. Davis. Mar 60, 7p.
NAVORD 6646

Unclassified report

Descriptors: *Test sets, Portable, Control panels, Human engineering, Structural properties, Heat exchangers, Calibration, Electronic equipment, Test equipment (Electronics), Structural parts, Design, Environmental tests.

The performance and design objectives which were generally common to all field-type test sets developed in the air and surface weapons program of the Naval Ordnance Laboratory were presented. For maximum usefulness the objectives were stated as specifically as possible. Individual design problems will require supplementary objectives and possibly exceptions to objectives presented. (Author)

AD-403 809 Div. 8
(TISTE/OHD) OTS price $9.60

Radio Corp. of America, Somerville, N. J.
DEVELOPMENT OF HIGH TEMPERATURE SEMICONDUCTOR DEVICES.
Final rept., May 58-July 62,
by H. Becke, W. A. Bosenberg, N. Ditrick, and F. L. Vogel. Feb 63, 110p.
Contract AF33 600 37267, Proj. 4460, Task 446002
ASD TDR63 59

Unclassified report

Descriptors: *Semiconductor devices, Avalanche diodes, Gallium compounds, Arsenides, Semiconductors, Diodes (Semiconductor), Rectifiers, Tunnel diodes, Transistors, Manufacturing methods, Solid state physics, Temperature.

Gallium arsenide was chosen as the semiconductor material best suited to meet the needs of high-temperature operation because of its wide band gap and high electron mobility. Even though gallium arsenide has the best potential for high-temperature operation, it does have a few limitations. One of these being that there are a number of major differences between elemental and compound semiconductors. A number of different devices were developed under this contract. These include: switching diodes, low-power rectifiers, medium-power rectifiers, high-power rectifiers, zener diodes, tunnel diodes, unipolar transistors, switching transistors, power transistors and solid ceramic circuits. Of these the most successful were tunnel diodes and varactor diodes, since they are able to fulfill the requirements of some specific applications not filled by similar germanium and silicon devices. (Author)

AD-403 816 Div. 8
(TISTP/JW) OTS price $3.60

Servomechanisms, Inc., Goleta, Calif.
ARMY/NAVY INSTRUMENTATION PROGRAM ORGANIC FILM TUNNEL EMISSION INVESTIGATION.
Final rept.,
by Gordon N. Steele. Mar 63, 27p. R63 1
Contract Nonr107600

Unclassified report

Descriptors: *Dielectric properties, *Triodes, Instrumentation, Electronic equipment, Films, Emissivity.

Completion is discussed of the first phase of a larger program to investigate the feasibility of making tunnel emission devices utilizing an organic film dielectric layer. The results obtained so far are encouraging in that non-linear behavior of organic film configurations has been observed under conditions appropriate for tunneling. Work is continuing to develop additional knowledge in this area. (Author)

AD-403 833 Div. 8
(TISTE/CRJ) OTS price $2.80

David Sarnoff Research Center, Princeton, N. J.
CESIUM VAPOR CATHODE STUDY.
Technical note no. 3, 15 Dec 62-14 Mar 63,
by A. L. Eichenbaum, P. T. Smith, F. Norman, and H. Sobol. 14 Mar 63, 22p.
Contract AF30 602 2767, Proj. 5573, Task 557303
RADC TDR63 138 Unclassified report

Descriptors: *Cesium electron tubes, *Cathodes (Electron tubes), Electron guns, Electron beams, Electrons, Ions, Vapors, Cesium, Tantalum, Niobium, Temperature, Hafnium, Diodes (Electron tubes), Electric potential, Electric currents.

Two approaches to the problem of extracting high-density electron beams from synthesized plasmas are under study: One uses a common surface for both ion and electron emission, the other employs separate surfaces. The first tantalum common-emitter hollow cathode tube, designated CE-1, was completed and awaits testing. The cathode, designed to yield an extracted current density of 100 amp/sq cm was taken up to its full operating temperature of 2250 K twice during tube processing with no mechanical or thermal difficulties being encountered. Experiments were carried out on plasma-cathode tubes with separate ion and electron emitters. These can be operated at temperatures lower than those of common-emitter surfaces since each emitter can be optimized separately. An extracted current density of 32 amp/sq cm was obtained from the aperture in a niobium electrode (this electrode was used for contact ionization of cesium and was located opposite an L-cathode). The synthesized plasma in this tube became the common-emitter type since L-cathode evaporants, which continually deposited on the niobium surface, caused the surface to be also a good electron emitter. In another tube, a hafnium surface was used for cesium contact ionization and a duo-emitter-type plasma was successfully synthesized. The extracted current density through the aperture was 12.3 amp/sq cm. This density should be considerably increased if excess ions are provided in the exit aperture area and if greater precaution is taken to avoid contamination of the L-cathode. (Author)

AD-403 835 Div. 8
(TISTP/FEM) OTS price $2.60

Mathematics Research Center, U. of Wisconsin, Madison.
THE STEADY-STATE DIFFRACTION OF ELECTROMAGNETIC RADIATION BY AN OBSTACLE IN AN INHOMOGENEOUS ANISOTROPIC CONDUCTING MEDIUM.
by Calvin H. Wilcox. Apr 63, 23p. TSR388
Contract DA11 022ORD2059

Unclassified report

Descriptors: *Electromagnetic waves, *Electromagnetic fields, Magnetic fields, Electric fields, Functions, Partial differential equations, Integration, Integral equations, Inequalities, Energy, Absorption, Equations, Topology, Sequences, Diffraction.

The diffraction of time-harmonic electromagnetic radiation by perfectly conducting obstacles immersed in an inhomogeneous, anisotropic, conducting medium is discussed. A mathematical formulation of the problem is presented which is applicable to obstacles of arbitrary shape and to a very general class of media, and the existence, uniqueness and continuous dependence on the data of the solution is demonstrated. (Author)

AD-403 870 Div. 8
(TISTE/CAM) OTS price $4.60

Centre de Physique Electronique et Corpusculaire (France).
RESEARCH ON NOISE IN CROSSED FIELD DEVICES.
Quarterly rept. no. 1.
Jan 63, 27p. WR971
Contract DA91 591EUC2025
Unclassified report

Descriptors: *Magnetrons, *Radiofrequency amplifiers, Electron guns, Cathodes (Electron tubes), Electrical impedance, Signal-to-noise ratio, Coupling circuits, L band, Experimental data, Phase shifters, Attenuation, Oscillation, Electron tubes, Noise (Radio).

AD-403 979 Div. 8
(TISTE/JWS) OTS price $9.60

Thomas, A. S. Inc., Boston, Mass.
NEW TECHNIQUES OF PATTERN SHAPING FOR LOW SILHOUETTE ANTENNAS.
Final rept.,
by Abdelnour S. Thomas. Jan 63, 100p. M58 4
Contract AF19 604 4983, Proj. 4600, Task 460002
AFCRL 63 102
Unclassified report

Descriptors: *Antenna configuration, *Dipole antennas, Antenna lobes, Phase modulation, Electromagnetic fields, Attenuation, Antenna feeds, Mathematical prediction, Amplitude modulation, Antenna radiation patterns.

The infinite modulated reactance sheet is studied with the phase and amplitude contours of the near field presented. It is shown that the infinite reactance sheet is an excellent description of the modulated Yagi. Experimental radiation patterns of low-sidelobe endfire arrays are given together with radiation patterns of Yagi arrays giving cosecant type radiations, flat-top flared beams, and beams at an arbitrary angle. The beams at an arbitrary angle are obtained from a cosine to the even power modulation of the relative wave number. (Author)

AD-403 982 Div. 8
(TISTE/JWS) OTS price $2.60

Centre De Physique Electronique et Corpusculaire (France).
RESEARCH ON NOISE IN CROSSED FIELD DEVICES.
Quarterly rept. no. 2.
Mar 63, 20p. WR1010; 445 1069
Contract DA91 591EUC2525
Unclassified report

Descriptors: *Electron tubes, *Noise (Radio), Attenuation, Standing wave ratios, Palladium, Impedance matching, Electrical properties, Magnetic fields, Measurement.

Attempts were made to achieve an attenuation of the fast mode having the required characteristics for use in a tube. For reasons shown, the interdigital line, initially designed, was replaced by a meander line. No radiation measurement was done so far on this structure. Hot tests have begun. The first results show that the tube amplifies. For an electronic gain of 22 db, no oscillation is observed in the absence of signal which makes the tube readily usable for noise measurements. (Author)

AD-403 984 Div. 8
(TISTM/PCR) OTS price $4.60

Doucette, E. I. Associates, Inc., Chatham, N. J.
A QUANTITATIVE STUDY OF THE EVOLUTION OF GASES FROM ELECTRON TUBES AND MATERIALS.
Scientific rept. no. 4, 18 Sep-18 Dec 62,
by W. J. Grubbs, G. H. Snider and F. I. Scott.
31 Jan 63, 40p.
Contract AF19 628 326, Proj. 4619, Task 46190
AFCRL 63 35
Unclassified report

Descriptors: *Electron tubes, Gas analysis, Mass spectroscopy, Spectrum analyzers, Tracer studies, Deuterium, Reliability, Degasification, Gases.

This work is aimed at achieving a higher degree of reliability in electron tubes through a better understanding of the kinds and quantities of gases which occur in these tubes. A bakeable, ultra-clean high vacuum system which incorporates an omegatron mass spectrometer was constructed for conducting these investigations. Several Amperex Type 5894 tubes were degassed by various schedules. The pumping speed of the ion pump was estimated for methane gas. Several difficulties with heating and operating the tube under test were resolved. The principal gas evolved during dc bombardment of this tube is hydrogen. (Author)

AD-403 986 Div. 8
(TISTE/JWS) OTS price $7.60

Centre De Physique Electronique et Corpusculaire (France).
RESEARCH ON NOISE IN CROSSED FIELD DEVICES.
Final rept.
Sep 62, 48p. WR929
Contract DA91 591EUC807
Unclassified report

Descriptors: *Electron guns, *Noise (Radio), Magnetic fields, Cathodes (Electron tubes), Particle trajectories, Differential equations, Electron beams, Electric currents, Temperature, Measurement.

Work was directed to a study of the anomalous effects observed in crossed field guns; the more stricking effect is the excess noise which may reach 10 to the fourth power times the thermal noise of the cathode and which causes the sole current in optical systems. The conditions in which such a noise appear are now well known; the spectrum and the correlation in the magnetic field direction have been determined. The theory of the excess noise has not yet been given; the experiments done show that the noise in the gun

proceeds from an instability of the space charge which may be modulated by the classical noise; according to this idea, the first step is to find an unstable flow. Up to now only a flow neglecting the space charge or a flow with constant current density has been studied. In this report a flow in which the cathode current is a linear function of the distance on the cathode was theoretically studied; the d-c results, obtained with a digital computer, are given in this report; some critical magnetic fields for which the electron velocities vanish after a particular angle constitute an unexpected phenomenon. On the other hand the computed trajectories permit to design a highly convergent gun which could present some advantages compared to the classical gun assuming a constant density. (Author)

AD-403 987 Div. 8
(TISTE/JWS) OTS price $5.60

Air Force Cambridge Research Labs., Bedford, Mass.
MODERN ANTENNAS FOR SPACE COMMUNICATIONS,
by C. J. Sletten. Feb 63, 47p.
Proj. 4600
AFCRL 63 51

Unclassified report

Descriptors: *Antennas, Antenna configurations, Lens antennas, Parabolic antennas, Antenna lobes, Antenna feeds, Antenna masts, Scanning, Radio interferometers, Phase shifters, Mapping, Radio astronomy, Space communication systems.

Research trends in antenna design stress the probability that space communication and detection functions of future systems will depend on giant-aperture antennas operating at several hundreds of megacycles per second. The design principles and merits of large-acreage antennas such as spherical reflectors, paraboloidal reflectors, parabolic cylinder antennas, flat antenna arrays, and interferometers are reviewed, with particular attention to the new multiplate antenna design. The electronic scanning methods of antennas and arrays that are compared include some advanced designs for nonlinear antennas. New techniques of multibeam generation and antenna pattern optimization are suggested for improving the aperture efficiency and information-gathering capacity of future radio and radar space telescopes. To achieve these and other desirable improvements in the performance of space antennas, focal region research is important. (Author)

AD-404 048 Div. 8, 28, 30
(TISTE/OHD) OTS price $9.60

Aeronutronic, Newport Beach, Calif.
RESEARCH ON BIAX TYPE ELEMENTS AND ASSOCIATED CIRCUITS (BIAX PERCEPTRON).
Annual summary rept. 1 Feb 62-31 Jan 63,
by J. K. Hawkins, C. J. Munsey, and R. A. Stafford. 31 Jan 63, 123p. U2111
Contract Nonr291300

Unclassified report

Descriptors: *Artificial intelligence, *Bionics, *Learning, Electrical networks, Computer logic, Computers, Simulation, Algebras, Machines.

Based upon the experimental work reported, the following three principles, which appear to be fundamental to successful multi-element network learning, have been formulated: (1) excess network capacity, (2) network self-evaluation, and (3) least-effort adaptation. A consistent body of experimental evidence supporting these principles has been developed. A parallel logic technique has been developed which makes possible the economical mechanization of large learning networks. In order to provide a standard of comparison for multi-element learning networks, a listing of all possible linear-input logic mechanizations of functions through four input variables was prepared. Based upon this list, functions can be arranged in some order of relative learning difficulty. The function difficulty, and possible forms of mechanization, therefore represents a standard against which experimental results on specific functions and learning methods may be compared. The list of four-input functions is presented in the Appendix. Experiments on learning in multi-element networks were conducted on the learning machine previously constructed. Based upon these experiments, and other simulations, new learning network principles were formulated. The new principles of network learning were reduced to specific form and hand simulated. The principles may be briefly described as: (1) excess network capacity, (2) network self-evaluation, and (3) least-effort adaptation. (Author)

AD-404 049 Div. 8, 26
(TISTE/CAM) OTS price $3.60

Crocker Burbank and Co., Assn., Fitchburg, Mass.
PRODUCTION ENGINEERING MEASURE ON CAPACITOR PAPER.
Final technical rept., 23 June 61-23 Mar 63,
by C. E. Cashman and J. D. Stacy. 23 Mar 63, 32p.
Contract DA36 039sc85970

Unclassified report

Descriptors: *Paper capacitors, *Paper, *Manufacturing methods, Production, Military requirements, Quality control, Reliability, Electrical properties, PH, Chlorides, Metals.

A comprehensive summary is presented on the engineering production measure to produce paper capacitors. Fourteen (14) production lots of 0.00025 in., 1.00 density, DC capacitor tissue were experimentally manufactured. The chemical and electrical evaluation of these paper lots indicates means have been found to improve the operational reliability of military DC capacitors. (Author)

AD-404 063 Div. 8, 5
(TISTE/CAM) OTS price $19.75

Melpar Inc., Falls Church, Va.
ENGINEERING EVALUATION OF U.S. ARMY SIGNAL CORPS AUTOMATIC ELECTRONIC TELEPHONE SWITCHING AND AUXILIARY EQUIPMENTS. VOLUME III. TEST RESULTS.
Final rept., Annex F.
Aug 62, 1v.
Contract DA36 039sc80543
AEPG ETA10

Unclassified report

Descriptors: *Electronic switches, *Telephone equipment, Multichannel telephone system, Transistors, Portable, Operation, Test methods, Multiplex, Telephone lines, Field wire, Radio equipment, Teletype equipment, Facsimile equipment, Data, Troposphere, Scattering, Signal-to-noise ratio, Electrical impedance, Sensitivity, Radio interference, Noise (Radio), Phase distortion, Automatic.

Division 8 - ELECTRONICS AND ELECTRONIC EQUIPMENT

AD-404 066 Div. 8
(TISTE/CAM) OTS price $2.60

Westinghouse Electric Corp., Washington, D. C.
HIGH CURRENT AND HIGH VOLTAGE SILICON CONTROLLED RECTIFIERS.
Quarterly rept. 3, 1 Jan-31 Mar 63.
31 Mar 63, 16p.
Contract NObsr87647, Proj. SR0080301 Task 9348
Unclassified report

Descriptors: *Rectifiers, *Power, Electric potential, Electric currents, Temperature, Quality control, Configuration, Electrical properties, Encapsulation, Alloys, Tables, Test methods, Surface properties, Silicon.

Both crucible grown and float-zone silicon crystals were received and processed through the initial stages of device fabrication. Evaluation data on both types of material are presented. Minor modifications of the basic device structure and encapsulation design are noted. Sample fabrication directed toward more complete evaluation of the device design and generation of state-of-art samples is discussed. Some problems which arose during this work are described. Electrical evaluation data on prototype samples (encapsulated) are given. (Author)

AD-404 067 Div. 8
(TISTE/CAM) OTS price $3.60

Micromega Corp., Venice, Calif.
C-BAND, WIDEBAND SOLID STATE AMPLIFIER.
Final technical rept.,
by Harvey M. Endler. Jan 63, 32p.
Contract AF30 602 2525, Proj. 5573 Task 557301
RADC TDR63 110
Unclassified report

Descriptors: *Parametric amplifiers, *Tuned amplifiers, C band, Broadband, Microwave amplifiers, Bandwidth, Gain, Noise (Radio), Mathematical analysis, Solid state physics, Varactor diodes.

A program is presented to develop two experimental models of a low noise diode parametric amplifier. The first amplifier is fixed tuned with an instantaneous amplifying bandwidth from 4000 to 6000 mc, and the second is to have an instantaneous bandwidth of 15 mc, electronically tunable, from 4000 to 6000 mc. Both units are to have noise figures under 3 db across the specified frequency range. In addition, both units are to have high operational stability, large dynamic range, freedom from spurious responses, and be applicable to either pulse or continuous wave (cw) signals. It was shown that both amplifiers are theoretically limited by the bandwidth of the amplifier signal circuit, and 2000 mc range was not to be expected from either unit. Best results obtained from the broadband unit are 900 mc bandwidth, at 12 db gain, and about 600 mc bandwidth at 17 db gain. The electronically tunable unit will tune about 900 mc at 20 db gain, with additional qualifications that are discussed in the report. Noise figures are under 4 db at all frequencies, with a minimum noise figure of 2.5db achieved in both amplifiers at certain frequencies. The remainder of the electrical specifications have been achieved, and are discussed. (Author)

AD-404 088 Div. 8, 26
(TISTE/CAM) OTS price $2.25

Sperry Gyroscope Co., Great Neck, N. Y.
CERAMIC-METAL SEALS FOR HIGH-POWER TUBES.
Final technical rept. 10 Apr 61-31 Oct 62,
by C. Johnson, I. Waraska, S. Cole, K. Styhr and E. Cheatham. Jan 63, 86p. NA8250 8331
Contract AF30 602 2371, Proj. 5573, Task 557303
RADC TDR63 43 Unclassified report

Descriptors: *Metal seals, *Ceramic materials, *Manufacturing methods, Quality control, Failure mechanics, Reliability, Electroplating, Sintering, Brazing, Coatings, Life expectancy, Processing, Electron tubes.

Variables associated with the fabrication of metal-to-ceramic seals were investigated to understand the mechanisms of failures and to improve manufacturing processes. The program primarily involved an extensive reliability study in which ceramic bodies, metallizing mixtures, plating, sintering, brazing, and other sealing practices were statistically evaluated. Environmental, life, and leak path studies supported the primary investigations. Recommended manufacturing procedures and controls were incorporated into a manual on metal-to-ceramic sealing techniques. An operating nonpumping ion gage was constructed. (Author)

AD-404 095 Div. 8
(TISTE/JBM) OTS price $4.60

Naval Ordnance Lab., Corona, Calif.
PROPERTIES OF MINIATURIZED TUNNEL DIODE CIRCUITS AT MICROWAVE FREQUENCIES,
by R. W. Yancey. 1 Apr 63, 38p.
NAVWEPS 8144
Unclassified report

Descriptors: *Tunnel diodes, *Circuits, *Radio receivers, *Microminiaturization (Electronics), *Radio receivers, K band, Extremely high frequency, Superhigh frequency, Radiofrequency amplifiers, Video amplifiers, Transistors, Noise radio, Detectors, Microwave amplifiers, Broadband, Microwave frequency.

The state of the art of semiconductor devices, especially tunnel diodes, is such that it is presently feasible to construct small, sensitive, low-power tuned RF microwave receivers up to and including K-band frequencies using only semiconductors as the active elements. Such a receiver might use tunnel diodes as the RF amplifier and detector and a transistor as the video amplifier. Receiver circuits of this type are shown to operate with a noise figure on the order of 5 db at frequencies at 10 Gc and above. Experiments indicate that tunnel diode operation at higher frequencies is possible, but the tunnel diodes should be physically integrated into the microwave structures for practical operation at 35 Gc. Tunnel diodes are very promising where low-level, broadband signals are needed. (Author)

AD-404 096 Div. 8, 26
(TISTE/CRJ) OTS price $1.10

ITT Industrial Labs., Fort Wayne, Ind.
PRODUCTION ENGINEERING MEASURE FOR TYPE FW-202 BARRIER GRID STORAGE TUBE.
Quarterly progress rept. no. 6, 1 Oct 62-31 Dec 62,
by J. M. Abraham. 10 Apr 63, 7p. S3235A
Contract DA36 039sc85967
Unclassified report

Descriptors: *Storage tubes, *Manufacturing methods, Electrodeposition, Dielectric films, Bonding, Electrodes, Nickel, Production.

Efforts were continued on a production engineering measure for the FW-202 barrier grid storage tube. Testing was completed on the six engineering samples. Improved processes on the electrophoretic deposition of the SG-67 frit has appreciably reduced the number of blemishes on the target surface. The use of nickel seed mesh in place of the copper seed mesh has resulted in a greater yield of good targets. (Author)

AD-404 098 Div. 8, 25
(TISTE/OHD) OTS price $14.50

Microwave Lab., Stanford U., Calif.
THE THEORY AND APPLICATION OF SOME TRANSVERSE-WAVE INTERACTIONS.
Technical rept.,
by Russell E. Hayes. Apr 63, 207p. 1025
Contract Nonr22548, Proj. NR373 361
Unclassified report

Descriptors: *Traveling-wave tubes, *Field theory, Microwave networks, Frequency multipliers, Bandwidth, Cavity resonators, Mathematical analysis, Coupling circuits, Electron beams.

The results of a theoretical and experimental investigation of transverse-wave couplers, and of frequency doublers employing these couplers in conjunction with a resonant quadrupole circuit, are described. The theory of both traveling-wave and resonant couplers is developed in detail so that the significant characteristics of the coupling interactions are described in terms of known quantities. The coupled mode theory was extended to include twisted transverse-wave couplers with a resulting clarification of this important class of interactions. The theory shows that the traveling-wave couplers may have a large bandwidth but generally tend to be quite long due to the low interaction impedance characterizing this type of circuit. Much stronger coupling per unit length is obtained by the use of resonant circuits with a resulting decrease in the length and bandwidth of the coupler. The type of coupler to be used in a particular device depends upon the requirements and restrictions involved. An experimental study of some of the coupling and frequency doubling schemes described in the theoretical analysis was carried out. In the course of this work several new types of transverse-field coupler and quadrupole circuits were investigated and found to be of practical importance. The experimental results were in good qualitative agreement with the theory.

AD-404 184 Div. 8
(TISTE/JWS) OTS price $3.60

Advanced Electronics Center, General Electric Co., Ithaca, N. Y.
SWITCH MODULATION TECHNIQUES.
Quarterly progress rept. no. 3, 1 Feb-30 Apr 62,
by Francisc C. Schwarz. 30 Apr 62, 30p.
Contract DA36 039sc87353, Task 3A99 09 002 05
Unclassified report

Report on features of the frequency-modulated self-stabilizing power modulator.

Descriptors: *Power supplies, *Switching circuits, Computer logic, Integrators, Modulators, Inverters, Diodes (Semiconductor), Transistors, Voltage regulators, Transformers, Semiconductor devices.

The saturable reactors were replaced by an electronic integrator, simulating operation of the saturable reactors with an improvement in accuracy of roughly two orders of magnitude. The entire control system was redesigned and reduced to practice following the discovery of insufficient accuracy in functional aspects, which were not apparent with operation of saturable reactors. A breadboard of the 260-watt unit except feedback and reference sources was established and brought to operation. An automatic adjustment of the system to the two line voltages in question, 115 and 230 v ac respectively, was devised. Electrical and mechanical design of units was completed and schematics established. Physical construction of experimental units is well advanced. Preliminary test data of the 260-watt experimental model indicate that all of the goals of this contract should be attainable. An active filtering effect of the FM-SS power modulator in excess of three was achieved, as expected, and secures the weight and size reduction of the bulky dc filters by a comparable factor. Weight and size reduction of the power transformer by application of inversion techniques exceeds expectations, and reduces this to a secondary problem. (Author)

AD-404 185 Div. 8
(TISTE/JWS) OTS price $3.60

General Electric Co., Schenectady, N. Y.
SILICON PLANAR EPITAXIAL TRANSISTOR. TYPE 2N2193.
Quarterly rept. no. 3, 31 Oct 62-31 Jan 63,
31 Jan 63, 1v.
Contract DA36 039sc86727
Unclassified report

Report on Production Engineering Measure.

Descriptors: *Transistors, Vapor plating, Vacuum apparatus, Silicon, Chemical milling, Bonding, Cleaning, Alloys, Boron, Phosphorus, Diffusion, Reliability (Electronics), Measurement, Manufacturing methods.

Contents:
Improved KPR resolution
Contact evaporation and alloying
Collector etching
Boron diffusion
Phosphorus diffusion
Collector Contact to the header
Interconnections
Reliability Measurement
Inspection and quality control plan

AD-404 234 Div. 8
(TISTE/JWS) OTS price $4.60

Scripta Technica, Inc., Washington, D. C.
SURVEY OF VACUUM PHOTOTUBES,
by Yu. Luk'yanov. 1962, 1v. T1678
Unclassified report

Trans. from Jnl. of Technical Physics, 13:1-2. pp. 3-34, Russian.

Descriptors: *Phototubes, Glass, Cesium compounds, Oxide cathodes, Antimony alloys, Photoconductivity, Cathodes (Electron tubes), Cesium electron tubes, Anodes (Electron tube), Life expectancy, Electrical properties, Manufacturing methods.

Contents:
Procedures for manufacturing phototubes
Design of phototubes
Luminous characteristics
Electrical characteristics
Application of phototubes; reference data

Division 8 - ELECTRONICS AND ELECTRONIC EQUIPMENT

AD-404 269 Div. 8
(TISTE/OHD) OTS price $18.00

Electron Physics Lab., U. of Michigan, Ann Arbor.
EFFICIENCY AND START-OSCILLATION CONDITIONS IN NONUNIFORM BACKWARD-WAVE OSCILLATORS,
by George I. Haddad. Mar 63, 262p. 05670 1T; TR61
Contract DA49 186AMC68, Proj. 05670
Unclassified report

Doctoral thesis.

Descriptors: *Backward-wave oscillators, *Electron tubes, Effectiveness, Electron beams, Circuits, Coupling circuits, Field theory, Oscillation, Electromagnetic waves, Nonlinear systems, Mathematical analysis, S band, Computers, Theory, Backward-wave tubes.

The effect of several kinds of nonuniformities in the circuit phase velocity and beam potential on the start-oscillation conditions of an O-type BWO were investigated. The nonuniformities include linear, quadratic and exponential circuit phase velocity tapers and linear, quadratic, exponential and sinusoidal voltage gradients. It is shown that under certain conditions the taper may be employed to either reduce the start-oscillation current or to suppress backward-wave oscillations in forward-wave amplifiers. Circuit phase velocity tapers for achieving phase-focusing and thus enhancing the efficiency of O-type BWO's are derived. Employing such a circuit taper in an experimental S-band BWO resulted in efficiency improvement factors of 1.2 to 2.0 to 1.0 over a frequency range of 2.0 to 4.0 gc. Efficiency enhancement through utilization of multisegment depressed collectors is investigated. Optimum collector segment voltages for achieving optimum efficiencies under typical operating conditions were determined and are presented. The utilization of prebunched beams in BWO's is considered and the effect on the start-oscillation conditions and efficiency is determined.

AD-404 447 Div. 8
(TISTE/JWS) OTS price $2.60

Electrical Engineering Research Lab., U. of Texas, Austin.
HIGH ALTITUDE MICROVARIATIONS WITHIN THE ATMOSPHERE'S RADIO REFRACTIVE-INDEX PROFILE,
by A. P. Deam and G. B. Walker. 28 Feb 63, 22p. 6 52
Contract AF19 604 8038, Proj. 5631, Task 563104
AFCRL 63 71
Unclassified report

Descriptors: *Atmosphere, *Radio signals, *Refractometers, Flight paths, Recording systems, Frequency, Parachute descents, Temperature, Errors, Pressure, Radiosondes, Phase-locked communication systems, Telemetering receivers, Refractive index, Balloons.

Observations of certain microscale fluctuations in the radio index of refraction of the earth's atmosphere are presented. The measurements are unique in that the height profile has been continuously detailed to one part in a million with a remote-operating, 400-mc refractometer. Data are insufficient to reach any statistical conclusion, but are revealing in showing the turbulent structure within the height profile. A limited amount of data show the excursions in index observed to 50,000 feet. (Author)

AD-404 472 Div. 8
(TISTM/LMH) OTS price $3.60

Air Force Cambridge Research Labs., Bedford, Mass.
ENVIRONMENT SENSING - A NEW APPROACH TO THE DESIGN OF AN ELECTRONIC AID FOR THE BLIND.
Research note,
by Walton B. Bishop. Mar 63, 26p.
Proj. 4608
AFCRL 63 64
Unclassified report

Descriptors: *Bionics, *Blindness, Pattern recognition, Sensory mechanisms, Artificial intelligence, Cybernetics, Prosthetics, Human engineering, Light, Solid state physics.

Environment sensing is defined as the collecting of sufficient information in useable form concerning one's environment to permit safe mobility. Primary emphasis is placed upon the design of a device suitable for use by the blind. Several other important applications await its completion. It is assumed that environment sensing should be accomplished with passive devices, that is, no transmitters or special light sources should be needed, and that the environment sensing device should produce no degradation of the sense of hearing. Two devices are described: one accepts light approaching over a very small solid angle; the other accepts light over a reasonably large but adjustable solid angle. The geometrical problems associated with the use of these sensors are discussed. Environment sensing is described in terms of eleven simple problems suitable for a theoretical mechanical man (machine) to solve. A blind human being should be able to solve at least these eleven problems if provided with a suitable transducer for relaying the information to his brain. A transducer using the sense of touch is suggested as being most desirable. Both the sensing device and the transducer appear to be physically realizable with solid-state electronic circuitry. (Author)

AD-404 476 Div. 8, 6
(TISTP/JEA) OTS price $3.60

Electronic Defense Lab., Mountain View, Calif.
IMPROVEMENT IN GAUSSIAN SIGNAL PERCEPTION BY DETERMINISTIC SIGNAL INJECTION AND HARMONIC-ZONE DETECTION,
by Arthur Weiner and William R. Kelly. 8 Feb 63, 28p. M 531
Contract DA36 039sc87499
Unclassified report

Descriptors: *Phase detectors, *Noise (Radio), *Radio signals, Amplitude modulation, Narrowband, Frequency multipliers, Signal-to-noise ratio, Band-pass filters, Broadband, Limiters, Radiofrequency amplifiers, Test equipment (Electronics), Noise generators, Energy, Noise analyzers, Detection.

An experimental investigation of perception of narrowband, Gaussian signals was performed. A new technique, using a reference sine wave, a stiff limiter, and a harmonic-zone filter, was investigated. The technique used both energy and gross phase characteristics of the Gaussian signal in the perception process. The comparison of this new technique with energy detection showed equal signal perception at 3-db lower S/N ratios for perception probabilities greater than 0.5 at fixed, false-alarm probabilities of 1/1000, 1/10,000, 1/100,000, and 10 to the minus 6th power. (Author)

AD-404 484 Div. 8, 30
(TISTE/JWS) OTS price $19.75

New York U., N. Y.
PROCEEDINGS OF THE HIGH-POWER MICROWAVE TUBES SYMPOSIUM HELD AT THE HEXAGON, FORT MONMOUTH, NEW JERSEY ON 25 AND 26 SEPTEMBER 1962. VOLUME I. 1963, 319p.
Contract DA36 039sc89076
Unclassified report

Descriptors: *Electron tubes, *Microwave amplifiers, *Symposia, Klystrons, Modulators, Electron beams, Traveling wave tubes, Temperature, Waveguide windows, Power, Waveguides, Microwave frequency.

Contents: A broadband megawatt hollow-beam multicavity klystron; The multiple-beam traveling-wave klystron; The design of wide-band, traveling-wave klystron; Modulator design considerations; Super-power generation by linear beam tubes; The biased-gap klystron; The electromagnetic amplifying lens: progress and potentialities; Improved performance characteristics of megawatt TWT's; A megawatt, X-band, TWT amplifier with 18% bandwidth; High-power CW amplifier for 50-56 Gc frequency range; A 100-Gc, high-power, backward-wave oscillator; Characteristics of high-perveance, hollow-beam guns for super-power tubes; Application of magnetron injection guns in high-power microwave tubes; The current and velocity distributions in a velocity-modulated, Brillouin-focused electron beam; Measurement of the surface temperature of a solid under electron bombardment; Design for a broadband, S-band, very-high-power, crossed-field amplifier; High-power waveguide windows; Super-power resonant ring; High-average-power microwave window study at L-band; Dual stage amplitron for super-power.

AD-404 497 Div. 8, 25
(TISTE/JBM) OTS price $4.60

Raytheon Co., Waltham, Mass.
HIGH FREQUENCY TUNNEL DEVICE STUDY,
by J. Lavine and W. Feist. Dec 62, 37p. TN3
Contract AF30 602 2673, Proj. 4506, Task 450602
RADC TDR63 33
Unclassified report

Descriptors: *Microwave amplifiers, *Cathodes, *Transistor amplifiers, Aluminum compounds, Noise (Radio), Superhigh frequency, Ultra-high frequency, Oxides, Cadmium alloys, Sulfur, Processing, Gold, Germanium, Electrodes, Electric currents, Gain, Electric insulation, Field emission, Vapor plating, Manufacturing methods, Configurations, Metal films, Electric potential, Solid state physics, Films.

Research was continued on low-noise microwave amplification by tunneling. An all-solid-state device and a thin-film cathode in conjunction with a microwave structure were studied. Metal-base transistor structures were fabricated with Ge collectors, thin-film Au bases and single crystal Ge, Si, and evaporated CdS emitters. Plasma oxidation of Al films deposited upon Ge was performed. Metal-interface amplifier structures with evaporated CdS emitters have shown no improvement and still suggest that hot electrons are not involved in the current transfer mechanism. Approximately 150 test cathode structures were produced. Pulsed emission current densities of up to several amperes per sq cm. were obtained. The requirements on cathode dimensions and performance necessary to achieve 20 db gain at 10 kmc were theoretically established. Since the tunneling insulator appears to be one of the very critical elements in the production of a suitable tunnel cathode, a study of these layers was undertaken. From the results of experimental measures, attempts were made to determine whether the Al-Al2O3-Au structure previously described is an advantageous one, and which basic factors are responsible for limiting the performance. A theoretical model is postulated to explain the functioning of this structure. (Author)

AD-404 503 Div. 8
(TISTE/JBM) OTS price $2.60

New York U., Coll. of Engineering, N. Y.
REALIZABILITY CONDITIONS ON TWO-PORT NETWORK PARAMETERS,
by Robert Maisel. Mar 63, 25p. SR2
Contract AF19 628 379, Proj. 5632, Task 563204
AFCRL 63 85 Unclassified report

Descriptors: *Networks, Electrical impedance, Linear systems, Electrical properties, Matrix algebra, Equations, Analysis.

The necessary and sufficient conditions for the realizability of linear, passive, time-invariant two-port networks are derived in terms of the various two-port parameters. The two-port parameters considered are: the open circuit impedance (Z) parameters, the short circuit admittance (Y) parameters, the hybrid (H) parameters, the transmission (ABCD) parameters, and the scattering (S) parameters. The derivation is based on the definition of a positive, real-impedance matrix for a two-port network. (Author)

AD-404 504 Div. 8, 1
(TISTE/CAM) OTS price $3.60

Air Force Cambridge Research Labs., Bedford, Mass.
HIGH ALTITUDE X-BAND NOISE MEASUREMENTS,
by S. Hunt, A. S. Orange, and K. Glick. Apr 63, 31p.
Proj. 4610
AFCRL 63 87 Unclassified report

Descriptors: *Noise (Radio), *Radiometer, *Jet plane noise, Airborne, X band, Parabolic antennas, Antenna radiation patterns, Temperature, Blackbody radiation, Terrain, Snow, Ice, Clouds, Tables, Measurement, Jet planes.

Presented are X-band noise temperature data obtained with an airborne radiometer installed in a high-speed jet aircraft (KC-135). The aircraft was found to be an electrically quiet environment at X-band. The data show the considerable influence of blackbody radiation from the earth entering the antenna sidelobes. Temperatures close to those calculated theoretically were measured over water and at high antenna elevation angles. Heavy clouds, though many thousands of feet below the aircraft, caused a considerable temperature increased. A trend of lower temperatures with increasing altitude was observed. The apparent temperatures of land, snow, and ice and water are discussed. (Author)

AD-404 516 Div. 8, 26
(TISTE/JBM) OTS price $3.60

General Electric Co., Owensboro, Ky.
7486 CERAMIC TRIODE, PRODUCTION ENGINEERING MEASURE.
Quarterly progress rept. no. 3, 1 Jan-31 Mar 63, by J. D. Marshall. 31 Mar 63, 34p.
Contract DA36 039sc86738
Unclassified report

Descriptors: *Production, *Triodes, Processing, Cathodes (Electron tubes), Electric currents, Life expectancy, Ultrahigh frequency, Superhigh frequency, Vacuum apparatus, Electric insulation, Rhenium alloys, Tungsten alloys, Power, Electron tube heaters, Configuration, Electric potential, Stabilization, Ceramic materials, Electron tubes, Production.

Efforts were continued on improving processing equipment and techniques for the production of triode tube type 7486. Life testing was completed for evaluation of the present product. Testing of heater design changes was completed. Effects of new cathode spray masks were evaluted. Construction of tubes containing design changes was started and life testing will soon begin. (Author)

AD-404 537 Div. 8, 26
(TISTE/OHD) OTS price $4.60

Radio Corp. of America, Somerville, N. J.
PRODUCTION ENGINEERING MEASURE ON 2N1708 SILICON PLANAR EPITAXIAL TRANSISTOR.
Quarterly rept. no. 3, 1 Nov 62-31 Jan 63,
by L. R. Possemato. 31 Jan 63, 36p.
Contract DA36 039sc86729
Unclassified report

Descriptors: *Manufacturing methods, *Transistors, Silicon, Cleaning, Epitaxial growth, Diffusion, Chemical milling, Contamination, Impurities, Phosphorus, Fixed contacts, Gold, Malfunctions, Processing.

A technique of etching the wafers with anhydrous HCl in the epitaxial tube prior to epitaxial deposition was incorporated into the process. The oxide on the surface of the wafer serves as a mask during the diffusion operation and generally serves to protect the silicon surfaces during wafer processing. In performing these functions, however, impurities may be diffused into the oxide at the high diffusion temperatures. A method was developed providing the cleanest possible oxide to improve the surface protection on the finished pellets. Experiments are also being made on baking of oxide to diffuse entrapped water molecules to the surface for subsequent evaporation. (Author)

AD-404 541 Div. 8, 26
(TISTE/JBM) OTS price $2.60

Microwave Associates Inc., Burlington, Mass.
VARACTOR DIODE INDUSTRIAL PREPAREDNESS MEASURES.
Quarterly progress rept. no. 11, 25 Dec 62-25 Mar 63.
25 Mar 63, 11p.
Contract DA36 039sc85941
Unclassified report

Descriptors: *Varactor diodes, Resistance (Electrical), Diffusion, Test methods, Transmission lines, Reliability, Monoxides, Packaged circuits, Fixed contacts, Bonding, Microwave frequency, Manufacturing methods.

Efforts were continued on the establishment of a capability to mass produce diffused mesa, silicon varactor diodes. A method for measuring the series resistance of a varactor diode is presented. The measurement is based on a determination of the transmission loss due to inserting a diode in a shunt with a transmission line. The transmission loss, minimized by series tuning of the diode, is converted to series resistance in ohms through use of a conversion graph. A method for passivating the surface of silicon is also presented describing the actual increase in production and reliability through the use of this technique. A new pill package style is discussed This pill package has allowed the production of a more reliable finished semiconductor product. (Author)

AD-404 564 Div. 8
(TISTE/CAM) OTS price $5.60

Space Electronics Corp., Glendale, Calif.
EXPERIMENTAL RESEARCH INVESTIGATION OF EXTREMELY LOW FREQUENCY PROPAGATION,
by R. D. Smith, P. F. Kuhnle, and T. M. Georges.
15 Feb 63, 45p. SR1 212R-4
Contract AF19 628 1603, Proj. 4603, Task 460305
AFCRL 63 46 Unclassified report

Descriptors: *Propagation, *Electromagnetic waves, Radio transmission, Radio reception, Radio stations, Radio ranges, Data, Site selection, Antennas, Radio transmitters, Radio receivers, Experimental data, Tables, Radio equipment, Atmospherics, Analysis, Measurement, Extremely low frequency.

Characteristics of ELF electromagnetic wave propagation were investigated by measuring the characteristics of cw signals transmitted over a 400 link. Propagation measurements were carried out during July and October 1962. Signal strength, received and transmitted signal phase, and atmospheric noise were recorded. Data reduction and analysis showed that received values of signal strength were 2 db less during nighttime and 4 db less during daytime than the values predicted by analytical studies carried out during the previous contract. Data reduction and analysis of the recorded phase data showed that more stable reference signal sources are required at transmitter and receiver. The form of the record obtained over a link which had approximately a 6 db signal to noise ratio in a 1 cp band indicates that a useful technique has been evolved. Atmospheric noise data was recorded for all transmission periods. This data is presented in the form of amplitude probability distributions and impulses per unit time distributions. (Author)

AD-404 580 Div. 8, 25
(TISTP/MH) OTS price $18.00

Research Lab. of Electronics, Mass. Inst. of Tech., Cambridge.
(No title).
Quarterly progress rept. no. 69,
by H. J. Zimmermann, G. G. Harvey, and W. B. Davenport, Jr. 15 Apr 63, 265p.
Contracts DA36 039sc8108 and AF19 604 5992
Unclassified report

Descriptors: *Research program administration, Radio astronomy, Microwaves, Microwave spectroscopy, Plasma physics, Magnetohydrodynamics, Communication theory, Artificial intelligence, Speech recognition, Biophysics, Neurology.

This report, the sixty-ninth in a series of quarterly reports issued by the Research Laboratory of Electronics, contains a review of the research activities of the Laboratory for the three-month period ending February 28, 1963. Since this is a report on work in progress, some of the results may not be final. (Author)

AD-404 588 Div. 8, 30
(TISTE/JWS) OTS price $1.10

Hughes Research Labs., Malibu, Calif.
RESEARCH INVESTIGATION OF p-i-n ELECTRON JUNCTION DETECTORS.
Interim engineering rept. no. 1, 11 Feb-11 May 63. May 63, 4p.
Contract NObsr89169
Unclassified report

Descriptors: *Diodes (Semiconductor), *Radiation measurement system components, Test methods, Silicon alloys, Lithium alloys, Dose rate, Electrometers, Beta particles.

For the purposes of studying the response of silicon, lithium-drifted p-i-n junction detectors to electron sources, an extrapolation chamber and its associated circuitry were set up and put in working condition. The measurement of surface dose rates for carefully specified geometries has begun, using a liquid thallium-204 thick source. (Author)

AD-404 627 Div. 8
(TISTE/JWS) OTS price $2.60

Electron Physics Lab., U. of Michigan, Ann Arbor.
RESEARCH AND DEVELOPMENT ON HIGH-POWER CRESTATRONS FOR THE 100-300 MC FREQUENCY RANGE.
Quarterly progress rept. no. 11, 1 Jan-1 Apr 63, by G. T. Konrad. Apr 63, 20p. 03783 12P
Contract NObsr81403, Proj. SF0100201
Unclassified report

Descriptors: *Traveling wave tubes, Electron guns, Very high frequency, Secondary emission, Standing wave ratios, Gain, Power, Electron beams, Electrostatic fields, Power amplifiers.

In the electrostatic focusing system employing the P micron = 4.46 hollow-beam gun it is shown that a substantial portion of the observed beam interception is due to secondary electrons. One method of reducing this effect is shown. Scaling the P micron = 4.46 gun to a value of 20 is described. Two 100-watt Crestatrons were tested at reduced power due to a poor r-f match in the first tube and to high beam interception in the second tube. It is apparent from the data, however, that most of the design objectives have already been easily met. These are a full 3 to 1 bandwidth under small-signal as well as saturation conditions, more than enough small-signal gain and quite encouraging values of conversion efficiency. (Author)

AD-404 633 Div. 8, 5
(TISTM/LMH) OTS price $1.60

Watkins-Johnson Co., Palo Alto, Calif.
RESEARCH AND INVESTIGATION OF MATERIALS FOR LASER APPLICATIONS.
Interim engineering rept. no. 3, 1 Jan-31 Mar 63, by R. Fitzpatrick and S. E. Sobottka. 31 Mar 63, 13p. W J63 612R12
Contract AF33 657 8917
Unclassified report

Descriptors: *Semiconductors, *Lasers, *Germanium compounds, Diodes, Single crystals (Metallurgy), Intermetallic compounds, Neodymium, Luminescence, Optics, Germanium alloys, Low temperature research, Processing, Feasibility studies, Arsenides.

AD-404 652 Div. 8
(TISTE/JWS) OTS price $2.60

National Cash Register Co., Dayton, Ohio.
FEASIBILITY INVESTIGATION OF CHEMICALLY SPRAYED THIN FILM PHOTOVOLTAIC CONVERTERS.
Quarterly rept. no. 4, 1 Feb-30 Apr 63, by R. R. Chamberlin and J. S. Skarman. 30 Apr 63, 24p.
Contract AF33 657 7919, Proj. 8173, Task 817301
Unclassified report

Descriptors: *Solar cells, *Semiconducting films, Sprays, Cadmium compounds, Sulfides, Solar panels, Glass, Crystallization, Molybdenum, Copper compounds, Polyester plastics, X-ray diffraction analysis, Feasibility studies.

Applied research was conducted to obtain experimental data which will demonstrate the feasibility of fabricating a thin film photovoltaic converter, using a chemical spray process, and if feasibility is shown, to extend the research to the problems of fabricating a large-area thin-film flexible solar cell array. (Author)

AD-404 660 Div. 8
(TISTE/CAM) OTS price $16.00

Boeing Co., Seattle, Wash.
PCM TELEMETRY SUPPLEMENTAL DATA SHEETS. GTM 004C-MAB 2.
30 Mar 62, 244p. 25 33418
Unclassified report

Descriptors: *Telemeter systems, *Pulse modulation, Experimental data, Tables, Switching circuits, Electronic switches, Test methods, Data, Time, Pulse modulation, Coding.

9. FLUID MECHANICS

AD-403 697 Div. 9
(TISTP/FEM) OTS price $2.50

Aerodynamic Lab., Ohio State U., Research Foundation, Columbus.
AN EXPERIMENTAL INVESTIGATION OF THE SURFACE PRESSURE AND THE LAMINAR BOUNDARY LAYER ON A BLUNT FLAT PLATE IN HYPERSONIC FLOW. VOL 1. SURFACE PRESSURE DISTRIBUTIONS ON A BLUNTED FLAT PLATE.
Final rept. Jan 61-Aug 62, by G. M. Gregorek, T. C. Nark and J. D. Lee. Mar 63, 104p.
Contract AF33 616 7827, Proj. 1366, Task 136606
ASD TDR62 792, V1
Unclassified report

Report on Aerodynamics and Flight Mechanics.

Descriptors: *Boundary layer, *Surface properties, Boundary layer problems, Measurements, Hypersonic wind tunnels, Reynolds number, Heat transfer, Temperature, Statistical distributions, Errors, Hypersonic flow, Angle of attack, Flat plate models, Pressure.

Pressures were measured over the surface of an unswept blunt flat plate having a cylindrical leading edge 1/2-inch in diameter. The flat plate was side-mounted in the ALOSU 12-inch continuous hypersonic wind tunnel. Separate tests were conducted with cylinders in order

to obtain detailed data for the leading-edge. Stagnation temperatures were sufficiently high to eliminate condensation effects. The leading-edge and cylinder pressure ratios were noted to be independent of both Mach number and Reynolds number. The flat plate pressure ratios show a small dependence on Mach number. Reynolds number effects on the plate pressure ratios were small except at the lower levels of Reynolds number where the interaction of the thickened boundary layer caused increases in pressure. (Author)

AD-403 711 Div. 9
(TISTA/LSK) OTS price $5.60

Institute of Engineering Research, U. of Calif., Berkeley.
SUPERSONIC STAGNATION POINT HEAT TRANSFER TO HEMISPHERE CYLINDERS AT LOW REYNOLDS NUMBERS.
by H. Tong and W. H. Giedt. Feb 63, 47p.
Contract AF33 657 8607, Proj. 7064, Task 7064 01
Unclassified report

Report on Aerothermodynamic Investigations in High Speed Flow.

Descriptors: *Hemispherical shells, Cylindrical bodies, Wind tunnel models, Model tests, Supersonic characteristics, Blunt bodies, Boundary layer, Theory, Hypersonic characteristics, Vortices, Heat transfer, Stagnation point.

Stagnation point heat transfer at low Reynolds numbers in a supersonic air stream was investigated experimentally. A transient technique was employed using precooled thin-walled hemisphere-cylinder models. Tests were conducted at nominal Mach numbers of 2, 4, and 6, and in the Reynolds number range of 80 to 1500. Results are best represented by continuum boundary layer theory. Scatter was about ±10%, so that any possible small shock wave-vorticity effect at the lower values of Reynolds number could not be identified. (Author)

AD-403 767 Div. 9
(TISTA/LSK) OTS price $2.60

Ballistic Research Labs., Aberdeen Proving Ground, Md.
THE MAGNUS FORCE ON A FINNED BODY,
by Anders S. Platou. Mar 63, 33p.
Proj. 1A222901A201
BRL 1193
Unclassified report

Descriptors: *Fin-stabilized ammunition, *Spin-stabilized ammunition, *Magnus force, Moments, Model tests, Wind tunnel models, Exterior ballistics, Determination.

The effect of spin on the aerodynamic forces generated on a slowly spinning finned projectile is analyzed. Experiments in the BRL wind tunnels, which substantiate the analysis, are described and presented. It is seen that the Magnus forces and moments are as large as those existing on a rapidly spinning nonfinned projectile where these forces are known to have an influence on accuracy and stability. (Author)

AD-403 778 Div. 9
(TISTP/JW) OTS price $4.60

Hydrodynamics Lab., Calif. Inst. of Tech., Pasadena.
SMALL-TIME BEHAVIOR OF UNSTEADY CAVITY FLOWS,
by D. P. Wang and T. Yao-tsu Wu. Mar 63, 38p.
97 3
Contract Nonr220 35
Unclassified report

Descriptors: *Fluid flow, Bodies of revolution, Motion, Non-linear systems, Hydrodynamics, Perturbation theory.

A perturbation theory is applied to investigate the small-time behavior of unsteady cavity flows in which the time-dependent part of the flow may be taken as a small-time expansion superimposed on an established steady cavity flow of an ideal fluid. One purpose of this paper is to study the effect of the intial cavity size on the resulting flow due to a given disturbance. Various existing steady cavity-flow models have been employed for this purpose to evaluate the initial reaction of a cavitated body in an unsteady motion. Furthermore, a physical model is proposed here to give a proper representation of the mechanism by which the cavity volume may be changed with time; the initial hydrdynamic force resulting from such change is calculated based on this model. (Author)

AD-403 808 Div. 9
(TISTP/WH) OTS price $1.60

Naval Ordnance Test Station, China Lake, Calif.
THE EFFECT OF A ROTATING CYLINDER AT THE LEADING AND TRAILING EDGES OF A HYDROFOIL,
by John D. Brooks. Apr 63, 14p.
NOTS TP3036, NAVWEPS 8042
Unclassified report

Descriptors: *Hydrofoils, *Magnus force, Lift, Drag, Cylindrical bodies, Water tunnels, Hydrodynamics.

An experimental investigation was conducted in the High Speed Water Tunnel at the California Institute of Technology on the lift, drag, and moment produced by a rotating cylinder in the leading and trailing edges of a hydrofoil. It was found that with the cylinder in the leading edge, only a small increase in lift was developed, while with the cylinder in the trailing edge a much larger lift increase was noted. (Author)

AD-403 873 Div. 9
(TISTP/WH) OTS price $1.60

Aeronautical Research Associates of Princeton, N. J.
EXAMINATION OF THE SOLUTIONS OF THE NAVIER-STOKES EQUATIONS FOR A CLASS OF THREE-DIMENSIONAL VORTICES. PART II: VELOCITY AND PRESSURE DISTRIBUTIONS FOR UNSTEADY MOTION.
by Coleman duP. Donaldson and Roger D. Sullivan.
Nov 62, 13p. R50
Contract AF49 638 255
AFOSR TN60 1227
Unclassified report

Descriptors: *Fluid mechanics, *Partial differential equations, *Numerical analysis, *Vortices.

The incompressible flow inside a porous cylindrical tube having steady radial inflow and rotating about its axis in a sinusoidal manner is obtained

through solution of the complete Navier-Stokes equations. The nature of the tangential velocity profiles that result and the magnitudes of the mean pressure drop and the amplitude of the pressure fluctuations that are induced by the tangential velocities are discussed in some detail. (Author)

AD-403 936 Div. 9, 12
(TISTA/LSK) OTS price $2.25

Aeronautical Systems Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
OPTIMIZATION OF LIFTING RE-ENTRY VEHICLES,
by Wilbur L. Hankey, Jr. Mar 63, 80p.
ASD TDR62 1102 Unclassified report

Report on Weapon System 620A.

Descriptors: *Boost-glide vehicles, Airplane landings, Drag, Deceleration, Reentry vehicles, Aerodynamic heating, Stability, Equations, Descent trajectories, Aerodynamic loading, Lift, Atmosphere entry, Aerodynamic configurations.

Aerodynamic lift is used during re-entry to provide range maneuverability so that a precise site can be selected and a horizontal landing capability can be provided. Maximum maneuverability may be achieved by modulating the hypersonic lift-to-drag ratio (L/D). In this study the lifting reentry configuration was optimized to maximize hypersonic L/D within the heating, stability, and landing constraints. Eleven pertinent constraint equations were formulated, and numerical calculations of the complete aerodynamic characteristics and configurational geometry were determined. The IBM 7090 computer was used to solve the 11 constraint equations through an iteration technique and to perform the maximization process. Optimum configurational geometries were evaluated for three wing loadings at vehicle weights of 10,000 and 100,000 pounds. Results show that higher L/D values can be achieved with low aspect ratio, low wing loadings, and large scale vehicles. The complete geometry for one of the typical optimums is shown as an example. (Author)

AD-404 045 Div. 9
(TISTE/JWS) OTS price $1.60

Brown U., Div. of Applied Mathematics, Providence, R. I.
FLOW BETWEEN CONCENTRIC ROTATION CYLINDERS -- A NOTE ON THE NARROW GAP APPROXIMATION,
by F. E. Bisshopp. Apr 63, 16p. TR51
Contract Nonr56207, Proj. NR 062 179
Unclassified report

Descriptors: *Fluid mechanics, *Fluid flow, *Cylindrical bodies, Pressure, Velocity, Partial differential equations, Viscosity.

Derivations of conditions under which steady flow between concentric rotating cylinders becomes unstable to perturbations of infinitesimal amplitude are often carried out within the framework of the narrow gap approximation in which the separation of the two cylinders is presumed to be much smaller than either radius. A narrow gap limit in which the ratio of the separation to a characteristic radius approaches zero is not uniquely defined, but rather the form of the resulting governing equations depends upon the manner in which the passage to the limit is made. A systematic survey of narrow gap limits may therefore be useful. (Author)

AD-404 069 Div. 9, 15, 25
(TISTP/FEM) OTS price $2.60

Northrop Ventura, Newbury Park, Calif.
INTEGRAL EQUATION FORMULATION OF THE BOUNDARY VALUE PROBLEMS OF ELASTICITY,
by Robert P. Banaugh. Apr 63, 22p. T P62.
Unclassified report

Descriptors: *Boundary value problems, *Elasticity, Linear systems, Stresses, Deformation, Mathematical analysis, Integral equations, Partial differential equations, Matrix algebra, Functions, Elastic scattering, Theory, Digital computers.

The three fundamental boundary value problems of the classical theory of linear elasticity have been formulated in a manner that permits maximum exploitation of numerical techniques and modern high speed digital computers. Both the static and dynamic cases have been included as well as arbitrary body forces. The extension to problems involving more than one media has been given and in addition no restrictions are placed on the boundary shape. (Author)

AD-404 197 Div. 9, 12
(TISTA/LSK) OTS price $9.10

Rosemount Aeronautical Labs., U. of Minn., Minneapolis.
AERODYNAMIC AND HEAT TRANSFER STUDIES WITH EVAPORATIVE FILM COOLING AT HYPERSONIC MACH NUMBERS,
by Rudolf Herman and W. L. Melnik. Sep 62, 87p.
RR189
Contract AF49 638 190, Proj. 9781
Unclassified report

Descriptors: *Blunt bodies, *Film cooling, Hypersonic characteristics, Heat transfer, Hemispherical shells, Conical bodies, Couette flow, Wind tunnel models, Model tests, Cylindrical bodies, Reentry vehicles, Nose cones, Aerodynamic characteristics, Film cooling, Hypersonic flight.

A theoretical model of evaporative film cooling was developed for blunt bodies indicating the effect of mass transfer on heat transfer for Prandtl and Lewis numbers unity. The velocity of the liquid film at the gas-liquid interface is assumed to be so small that the gaseous phase is unaffected. This assumption was verified by a numerical example from the analysis. With this approximation the effect of mass transfer (evaporation from the liquid film) on heat transfer from the gas-phase boundary layer was obtained from the literature on transpiration cooling. The velocity profile through the liquid film was found to be identical to that of a Couette flow with pressure gradient. The evaporative film cooling experiments were conducted on hemisphere-cylinder, blunted cone, and flat-faced cylinder models at Mach Number 6.8 in a high temperature hypersonic blowdown wind tunnel at the Rosemount Aeronautical Laboratories. (Author)

AD-404 216 Div. 9, 1
(TISTA/LSK) OTS price $1.60

General Dynamics/Convair, San Diego, Calif.
APPLICATION OF THE VERTICAL-FLOAT CONCEPT TO A 1/20 SCALE PBM-5 SEAPLANE.
Final rept.
by D. B. Dewey and J. T. Byrne. Mar 63, 13p.
63 064
Contract NOw62 0399
Unclassified report

Descriptors: *Flying boats, Airplane models, Hydraulic models, Model tests, Hydrodynamic configurations, Seaplanes, Fluid dynamic properties, Hydrodynamics, Seaplane floats.

To more fully ensure the success of a proposed full-scale, vertical-float seaplane program, limited testing was conducted on a 1/20 scale PBM-5 seaplane model. The model testing was done during the summer of 1962 at the towing basin facility of Convair's Hydrodynamic Laboratory and in San Diego bay, adjacent to the laboratory. An analytical study was made to determine the size and position of the floats to be installed on this particular model. Tests were then conducted on both the hull configuration and the stable, vertical-float version, and comparative data was recorded for pitching, rolling, and heaving motions induced by wave action. The model tests indicated that a vertical float system can be designed for seaplanes such that only minor pitching and rolling oscillations will result in sea-state 4. With the employment of an optimum vertical float system, seaplane heaving will be of small magnitude in sea-state 4. Seaplanes with vertical floats have low drift rates when compared to conventional hulls. The over-all results of the model tests are satisfactory enough to warrant immediate full-scale investigation of this principle, including studies to determine its effectiveness in ASW. (Author)

AD-404 260 Div. 9
(TISTP/FEM) OTS price $8.60

Fluid Mechanics Lab., Mass. Inst. of Tech., Cambridge.
FREE-MOLECULE FLOW IN THE AXIAL-FLOW TURBO-VACUUM PUMP.
Final rept., Mar 63,
by John S. Maulbetsch and Ascher H. Shapiro.
Mar 63, 45p. 63 3
Contract Nonr1841 55
Unclassified report

Descriptors: *Fluid flow, *Axially symmetric flow, *Vacuum pumps, Low pressure research, Compressible flow, Density, Pressure, Velocity, Computers, Reynolds number, Compressor rotors, Numerical analysis, Integral equations, Monte Carlo method, Errors, Statistical data, Axial-flow fans, Propeller pumps, Compressor blades.

The rarefied gas flow through a moving cascade of flat plates, as it applies to high-vacuum pumping, was investigated analytically and experimentally. The theory is based on the assumption of free-molecule flow, i.e., no collisions between molecules. The essential quantities determining the performance of a blade row are the net transmission probabilities from one side to the other. These transmission probabilities depend mainly on the blade angle and spacing-chord ratio and on the ratio of mechanical speed to mean molecular speed. The transmission coefficients are calculated by numerical solution of the governing integral equations, and are compared with the results of earlier Monte Carlo calculations. Experiments with a rotating test machine with either a single rotor or a rotor followed by a stator gave results in good agreement with the theory. A special means was developed for testing stationary cascades under conditions simulating the operation of a moving rotor. This apparatus was tested with several blade geometries. The results confirmed both the theory and the feasibility of the new rarefied gas wind-tunnel concept. (Author)

AD-404 467 Div. 9, 22
(TISTP/JW) OTS price $5.60

Ballistic Research Lab., Aberdeen Proving Ground, Md.
HEAT TRANSFER, BARREL TEMPERATURES AND THERMAL STRAINS IN GUNS,
by Ernest L. Bannister, Richard N. Jones, and Donal W. Bagwell. Feb 63, 59p.
BRL 1192 Unclassified report

Descriptors: *Guns, *Heat transfer, Boundary layer, Thermal stresses, Analysis, Artillery fire, Temperature.

Data on temperature distribution and heat input in a 37mm gun during firing are presented. These results are discussed and compared with theoretical values obtained by using Nordheim, Soodak and Nordheim method of calculation. (Author)

AD-404 481 Div. 9, 25
(TISTP/JW) OTS price $1.10

Connecticut U., Storrs.
THE MOTION OF A PLANE EVAPORATION FRONT IN A SUPERHEATED LIQUID,
by R. S. Brand. Apr 62, 12p. TR2
Contract Nonr329201, Proj. S R009 0101
Unclassified report

Descriptors: *Evaporation, *Liquids, Temperature, Numerical analysis, Motion, Velocity, Vaporization.

The velocity of the interface between liquid and vapor phases when a slightly superheated liquid changes to vapor is found. The temperature distribution in the liquid ahead of the evaporation front can then be determined by a numerical integration. (Author)

AD-404 486 Div. 9
(TISTP/JW) OTS price $8.10

David Taylor Model Basin, Washington, D. C.
INTERACTION EFFECTS PRODUCED BY A SONIC JET EXHAUSTING FROM A CURVED TWO-DIMENSIONAL PLATE IN A SUPERSONIC STREAM,
by C. Carl Brindle and David W. Moxley, Jr.
Apr 63, 86p. 3
DTMB 1053
Unclassified report

Descriptors: *Fluid flow, *Supersonic flow, Supersonic wind tunnels, Boundary layer, Shock waves, Pressure, Jets.

A wind-tunnel investigation was conducted to determine the effects of a sonic jet blowing perpendicularly from a curved two-dimensional plate. These tests were performed in the 9 1/2-Inch Supersonic Wind Tunnel of the Gas Dynamics Facility at Mach numbers of 2.48, 3.73, and 4.50. Experimental data are presented for (a) the interaction forces produced by the exhausting jet and the supersonic main stream and (b) the exhausting jet penetration into the supersonic main stream. Data were obtained for various slot locations and supply pressures. (Author)

AD-404 488 Div. 9
(TISTP/GRW) OTS price $12.50

Cornell U., Graduate School of Aeronautical Engineering, Ithaca, N. Y.
STAGNATION POINT FLOW OF A VARIABLE PROPERTY

FLUID AT LOW REYNOLDS NUMBERS,
by Michael Lenard. June 62, 168p.
Contract AF49 638 544
AFOSR 2981 Unclassified report

Descriptors: *Axially symmetric flow, *Gas flow, Partial differential equations, Reynolds number, Boundary layer, Tables, Velocity, Fluid flow, Stagnation point.

Steady, viscous, two-dimensional and axially symmetric stagnation-point flows of a gas are considered for the case when the Reynolds number is too low for the applicability of the classical boundary-layer theory. It is assumed that the low-density gas is still a continuous fluid, permitting the use of the Navier-Stokes and associated equations as the basis of the problem. The effects of low Reynolds number are determined by applying an expansion procedure to the fluid-dynamical equations. (Author)

AD-404 640 Div. 9
(TISTM/AW) OTS price $1.60

General Atomic Div., General Dynamics Corp.,
San Diego, Calif.
THE BEHAVIOR OF A THIN VISCOUS FILM UNDER MECHANICAL AND THERMAL FORCES,
by T. Teichmann. 8 May 61, 19p. 2257
Contract AF29 601 2207, Proj. 52
Unclassified report

Descriptors: *Fluid flow, Motion, Differential equations, Equations, Surfaces, Viscosity, Temperature, Boundary layer, Surface properties, Evaporation, Thermal conductivity, Flat plate models.

This treatment of the flow of a viscous, incompressible fluid over a flat plate under the influence of surface forces is designed to include at one time the presence of normal and tangential forces, and to deal with spatial and temporal behavior on an equivalent basis. It therefore serves to supplement and generalize the simpler, physically based account of Mautz. While it does not seem to lead to substantially new results, it enables consideration of more general spatial and temporal variations, without special artifices, and it illuminates the nature of the underlying approximations and their range of valid application. The additional consideration of heat conduction and evaporation seems to offer a possible description of the experimental findings when combined with the viscous flow. The problem to be considered is that of a thin, uniform layer of a viscous, incompressible fluid covering an infinite, flat, horizontal plate, and is subjected to a cylindrically symmetric surface force. (Author)

AD-404 644 Div. 9, 14
(TISTM/PCR) OTS price $1.60

General Atomic Div., General Dynamics Corp.,
San Diego, Calif.
VISCOUS FLOW OF ABLATING GREASE FILMS,
by H. R. Kratz, C. W. Mautz, and J. C. Stewart.
17 Apr 61, 12p. 2237
Contract AF29 601 2207, Proj. 52
Unclassified report

Descriptors: *Fluid flow, *Greases, *Ablation, Mathematical analysis, Pressure, Aerodynamic characteristics, Drag, Boundary layer, Fourier analysis, Liquid metals, Viscosity, Reynolds number, Films.

In a study of the ablation of metal surfaces by high-temperature gas flow, an experimental arrangement has evolved in which a gas of low density is driven down an evacuated tube at the end of which is a metal target plate of 12.5 cm diameter. The protective value of thin films of grease has come under study, and in this report we consider in turn the motion of the film under an assumed pressure profile, the motion under an assumed aerodynamic drag, and the decay of motion under no forces. (Author)

AD-404 646 Div. 9
(TISTP/FEM) OTS price $1.10

General Atomic Div., General Dynamics Corp.,
San Diego, Calif.
SOME FUNDAMENTAL PROPERTIES OF SHOCK WAVES,
by M. J. Nowak. 1 June 61, 9p. 2288
Contract AF29 601 2207, Proj. 52,
Unclassified report

Descriptors: *Fluid mechanics, *Shock waves, Partial differential equations, Integrals, Velocity, Integral equations, Fluid dynamic properties, Mathematical analysis.

The Rankine-Hugoniot conditions are examined and then applied to develop the similarity solution for a strong spherical shock. Several interesting theorems can be observed about the jump conditions. The similarity solution has been considered in the literature, but it apparently has not been carried out completely; it turns out that a simple solution is available to this important problem. (Author)

10. FUELS AND COMBUSTION

AD-404 084 Div. 10
(TISTM/AW) OTS price $3.60

Aeronautical Materials Lab., Naval Air Material Center, Philadelphia, Pa.
EFFECTS OF JET FUEL CONSTITUENTS ON COMBUSTOR DURABILITY,
by C. C. McClelland. 15 May 63, 13p.
NAEC AEL1736 Unclassified report

Descriptors: *Combustion chamber liners, *Jet engine fuels, Temperature, Hydrogen, Flames, Hydrocarbons, Turbojet engines, Thermal stresses.

The effects of fuel and combustion variables on liner temperatures and flame radiation of the J79 combustion chamber were investigated. The operating conditions were extended to higher inlet air temperature to show the effect of operation with advanced jet engines. Liner temperatures and flame radiation intensity in a J79 combustion chamber are functions of both the luminometer number and the hydrogen content of the fuel. As liner temperature tends to level out above a luminometer number of 100 there is little to be gained from further increase in this parameter. An increase in J79 combustor inlet air temperature will result in increases in flame radiation and in the liner temperature rise above inlet air temperature. The relationships with luminometer number are similar to those at lower temperature. Both luminometer number and hydrogen content of a fuel will provide satisfactory correlations with flame radiation and liner temperatures for future higher combustor inlet tem-

perature conditions. Liner temperatures in a jet engine combustor are directly proportinal to the intensity of the total flame radiation received by the liner. The position and intensity of the flame zone and the maximum liner temperature will vary with differences in combustor design and fuel type at a given set of operating conditions. (Author)

AD-404 181 Div. 10, 27, 4
(TISTM/TCG) OTS price $4.60

Technische Hochschule, Karlsruhe (Germany).
CATALYTIC ISOMERIZATION OF PARAFFIN BASE HYDROCARBONS WITH DUAL FUNCTION METAL CATALYSTS IN THE FIELD OF DIESEL AND JET FUELS.
Final technical rept. no. 1, 1 Jan 61-30 Nov 62, by Helmut Pichler. 3 Jan 63, 40p.
Contract DA91 591EUC2064
Unclassified report

Descriptors: *Fuel oil, *Jet engine fuels, *Hydroforming (Chemical), *Organic compounds, Molecular isomerism, Catalysis, Catalysts, Aluminum compounds, Oxides, Boron compounds, Chromatographic analysis, Quantitative analysis, Palladium, Diesel engines, Fuels, Hydrocarbons.

Isomerization and hydrocracking in the field were made with a soft paraffin wax to obtain products with properties similar to diesel and jet fuels. The catalyst used was 0,1 wt.% Pd on alumina-boria (4:1), as it gave the best isomerization results with n-hexane as starting material. Difficulties were encountered in the analysis of the reaction products. The analytical tool gas chromatography in combination with mass spectrometry was used. Experimental runs with n-nonane were conducted both in batch and continuous operations. The maximum yield of C-9 isomers was obtained for batch operations at a reaction temperature of 375 C and at a reaction time of 20 hr and for continuous operations at 425 C and 10 sec reaction time. The greater portion of C-9 isomers consisted of monomethyl isomers; the 2-, 3- and 4-methyloctanes were identified. From the dialkyl-isomers, the presence of 2, 3 dimethyl-, 2,5-dimethylheptane and 2-methyl 3-ethylhexane was confirmed. (Author)

AD-404 555 Div. 10, 22
(TISTP/MH) OTS price $8.10

Aerojet-General Corp., Azusa, Calif.
STUDY OF SUSCEPTIBILITY OF SOLID COMPOSITE PROPELLANTS TO EXPLOSION OR DETONATION. PHASE 2. FEASIBILITY STUDY OF DESENSITIZING ROCKET PROPELLANTS BY SUITABLE ATMOSPHERES.
Final rept.,
by T. G. Owe Berg. 12 Apr 63, 88p. 0253 05 01 FP
Contract NOrd18487
Unclassified report

Descriptors: *Explosive materials, *Solid rocket propellants, Ammunition components, Shock, Friction, Impact shock, Gases, Metals, Atmosphere, Propellants, Sensitivity, Explosions, Detonation.

The control or, at least, the understanding of the sensitivity of explosives and propellants is in most applications desirable and in many applications imperative. Such applications range from hazards in manufacture, handling, and storage to accurate timing of deliberate initiation. Such control has been effected in the past by a careful choice of explosive, addition of phlegmatizers, and similar methods. Not infrequently, however, an explosive or propellant may behave erratically and show a much higher or a much lower sensitivity than usual, with corresponding effects in the application. Such irregularities cannot always be explained, and it appears that the sensitivity may depend upon factors other than those customarily considered decisive. In the ideal case, the sensitivity should be controllable by means that do not affect deliberate initiation, or the desired properties of the explosive or propellant. Such means should apply to the environment of the explosive or propellant, e.g., to the surrounding and included gas, or to the surface state of the solid or liquid material. The work covered by this report is an experimental study of the feasibility of control of sensitivity by such external means. (Author)

11. GROUND TRANSPORTATION EQUIPMENT

AD-403 875 Div. 11
(TISTP/JEA) OTS price $1.10

Marine Corps Landing Force Development Center, Quantico, Va.
TEST OF A042 ENGINE IN M274 MECHANICAL MULE.
Final rept.
6 May 63, 6p.
NCLFDC 46 62 04 Unclassified report

Descriptors: *Internal combustion engines, *Cargo vehicles, Test methods, Acceptability, Lubrication, Reliability, Maintainability, Operation, Amphibious operations, Tests, Marine Corps.

The purpose of testing was to determine the suitability and functioning of a prototype model of the A042 engine installed in a CARRIER, LIGHT WEAPONS, INFANTRY, 1/2 TON, 4x4, M274, under the primary environmental and operating conditions that can be expected during amphibious operations. Further, to develop data which will enable designers to correct any deficiencies encountered. The conclusions were that the A042 test item engine, when suitably modified for deep water fording, will be satisfactory for use in the M274 Mechanical Mule, that waterproofing by using units is not feasible due to the extensive preparation necessary to waterproof the engine prior to fording, that an external recoil starter assembly would be preferable and easier to service. (Author)

12. GUIDED MISSILES

AD-403 512 Div. 12, 22
(TISTP/RD) OTS price $1.10

Magnavox Co., Urbana, Ill.
SOLID-STATE ARM SAFE DEVICE (PHASE III).

Monthly progress rept. no. 14, 1-28 Feb 63, by L. W. Ricketts. 5 Mar 63, 4p.
Contract DA11 0220RD4048
Unclassified report

Descriptors: *Arming devices, Switching circuits, Solid state physics, Safety, Semiconductors, Army equipment, Miniature electronic equipment, Guided missile warheads.

AD-403 524 Div. 12
(TISTW/MC) OTS price $4.60

Space Technology Labs., Inc., Redondo Beach, Calif.
INTERIM D-SERIES ATLAS RELIABILITY MEASUREMENT SYSTEM.
29 June 62, 39p. 6301 6268RU000
Contract AF04 694 3
BSD TDR62 335
Unclassified report

Descriptors: *Guided missiles (Surface to surface), Strategic weapons, Launch vehicles (Aerospace), Measurement, Data processing systems, Reliability.

An interim system is described for measurement of the reliability of the D-series Atlas weapon system. Operational site and PMR Category III data are used for calculation of reliability trend indices to the subsystem level in the standby, countdown and flight modes. A method for calculating apparent alert readiness probability from the same data is given. Data sources are identified and qualified, and data collection and processing methods are discussed. Sample exercises based on post-Golden Ram data are contained in Secret Addendum A, STL 6301-6269-RZ-000, of this report. (Author)

AD-403 534 Div. 12, 2
(TISTA/LSK) OTS price $12.50

Air Force Proving Ground Command, Eglin Air Force Base, Fla.
FIREFLY III, SOUNDING ROCKET LAUNCHING REPORT. LAUNCH FACILITY, VEHICLES, AND DATA REDUCTION (33 VEHICLES LAUNCHED 15 OCTOBER-15 DECEMBER 1962),
by William K. Vickery. Apr 63, 164p.
Proj. 4984W1
APGC TDR63 19, Vol. 1
Unclassified report

Descriptors: *Sounding rockets, Chemicals, Upper atmosphere, Atmosphere sounding, Launching sites, Electron density, Tables, Phototheodolite, Radar tracking, Optical tracking, Flight testing, Launching, Rocket trajectories.

Thirty-three sounding rockets (15 Nike-Cajun, 4 Nike-Apache, 9 Honest John-Nike-Nike, and 5 Aerobee 150) were launched from the Aerospace Launching Facility, Eglin Gulf Test Range, Florida. These launchings were conducted in support of Project Firefly III. The over-all report, consisting of Volumes 1 and 2, describes the sounding rockets, ballistic computations, range support, and the launch and flight data obtained. Specifically, Volume 2 (AD-403 429) presents only the theoretical and empirical vehicle trajectory data tabulated at the Air Proving Ground Center. Thirty-one rockets provided trajectories which were sufficient to meet the scientific requirements. Two Nike-Cajun flights were unsatisfactory. The maximum altitude predictions averaged approximately 3% high for the Aerobee 150's, 6% high for the Honest John-Nike-Nike's, and 7% high for the Nike-Cajun's. The maximum altitude predictions were also satisfactory for the Nike-Apache rockets. (Author)

AD-403 537 Div. 12, 22
(TISTP/JEA) OTS price $3.60

RCA Defense Electronic Products, Burlington, Mass.
LINEAR SHAPED CHARGE SEPARATION TESTS.
Quarterly progress rept. no. 1,
by S. J. Engel, S. Dulevskis, and R. R. Batchelder. 20 Apr 63, 1v.
13PB2085
Contract AF04 695 273, Proj. P706, Task 3
SSD TDR63 91, vol. 3 Unclassified report

Report on Program 706.

Descriptors: *Shaped charges, *Reentry vehicles, *Satellites (Artificial), Design, Staging, Instrumentation, Data processing systems, Installation, Resonance, Shock waves, Structural properties, Aerodynamic heating, Correlation techniques, Radiography, Statistical data, Shock (Mechanics), Structural parts, Tests, Separation.

A flexible linear shaped charge (FLSC) for vehicle stage separation has been designed. The pyrotechnics have been acceptance tested for susceptibility to handling shock and electromagnetic radiation. A technique for verifying alignment of the installed FLSC by radiograph has been developed. Instrumentation techniques and test plans have been developed for measuring the shock effects on a spacecraft structure from firing the FLSC separation system. (Author)

AD-403 825 Div. 12
(TISTA/LSK) OTS price $6.60

North American Aviation, Inc., Downey, Calif.
ATTITUDE CONTROL: A BIBLIOGRAPHY.
10 Apr 63, 46p. SID63 232
Unclassified report

Descriptors: *Attitude control systems, *Bibliographies, Satellites (Artificial), Spacecraft, Torque, Control jets, Vernier rocket motors, Spin-stabilized ammunition, Magnetic fields, Gravity, Solar radiation, Aerodynamic configurations, Terrestrial magnetism.

This report is a survey of academic literature on the attitude control of satellites and space vehicles. Only material published in English between the years 1958 and 1962 is included. (Author)

AD-403 872 Div. 12
(TISTP/WH) OTS price $3.60

Aerospace Corp., Los Angeles, Calif.
SELF-CONTAINED EXPLICIT GUIDANCE EQUATIONS FOR BALLISTIC MISSILES,
by Duncan MacPherson. Mar 63, 31p. TDR169 3335TN2
Contract AF04 695 169
BSD TDR63 41
Unclassified report

Descriptors: *Guided missiles, *Equations, *Guided missile trajectories, Celestial mechanics, Mobile, Motion.

A guidance equation mechanization for use with ballistic missiles is outlined. This technique does not require pre-launch targeting computations and is therefore especially suitable for mobile weapons systems. (Author)

AD-403 931 Div. 12
(TISTA/LSK) OTS price $2.60

Boeing Co., Seattle, Wash.
FLIGHT ARTICLE MASS PROPERTIES REPORT FOR MINUTEMAN WING II COMPONENTS FOR MISSILE 646 (GTM-020),
by Roger C. Wierenga. 1 Apr 63, 29p. D2 13946 2
Contract AF04 694 46
Unclassified report

Descriptors: *Guided missiles (Surface-to-surface), *Guided missile components, Tables, Weight.

This report contains mass property summaries of the Boeing components for missile 646 which is scheduled to be assembled at Air Force Plant 77 as GTM-020. Therefore, the data contained in this report reflect a modified Wing II missile incorporating the changes scheduled for GTM-020. (Author)

AD-403 981 Div. 12, 30
(TISTW/MC) OTS price $21.00

Aeronutronic, Newport Beach, Calif.
SIMULATION ERROR ANALYSIS SYSTEM, PROGRAMMING DOCUMENT,
30 Nov 62, 1v. U1909.
Contract AF19 604 7375
ESD TDR62 340
Unclassified report

Descriptors: *Satellites (Artificial), *Orbital trajectories, Simulation, Programming (Computers), Position finding, Errors, Tracking, Detection.

The theory, program philosophy, and operating instructions for the Simulation Error Analysis System (COSINE 5B) are presented. As a joint effort undertaken by the RCAF Directorate of Systems Evaluation and the USAF 496L Systems Project Office, the computer system, developed at Aeronutronic, provides an automatic means with which the observations of a specified orbit obtained from a sensor network may be simulated and analyzed, yielding the uncertainty in the orbit elements due to the observational inaccuracies. The system also provided the capability of predicting future position and velocity errors caused by the uncertainty in the orbit elements. (Author)

AD-404 175 Div. 12, 25
(TISTP/TL) OTS price $9.10

Vitro Labs., West Orange, N. J.
ALBEDO AND PLANET RADIATION INTERCEPTED BY AN EARTH SATELLITE,
by C. D. Fitz, S. J. Lukasik, E. A. Mayer, and D. R. Simon. May 63, 94p.
Contract AF40 600 951, Proj. 7778, Task 777801
AEDC TDR63 92
Unclassified report

Descriptors: *Albedo, *Solar radiation, *Satellites (Artificial), *Thermal radiation, Scientific satellites, Blackbody radiation, Stratosphere, Space environmental conditions, Earth, Ultraviolet radiation, Radiation damage, Simulation, Scattering, Orbital trajectories, Mechanical properties, Reflection, Sun, Organic materials, Inorganic compounds, Materials, Geometry, Spectra (Visible and Ultraviolet), Intensity, Measurements.

Contents:
Characteristics of primary solar radiation
Albedo and planet radiation characteristics
  Reflection and backscattering
  Planet radiation
  Ultraviolet radiation
  Combined characteristics
Radiation incident on a satellite
  Albedo illumination
  Planet radiation
  Total radiation incident on a satellite
Radiation effects and simulation tolerances
  Radiation effects
    Thermal effects
    Material effects
  Simulation tolerances
    Angular distribution
    Spectral distribution
    Cost effects

AD-404 230 Div. 12, 6
(TISTP/FEM) OTS price $1.60

Army Missile Command, Redstone Arsenal, Huntsville, Ala.
DETECTION AND DISCRIMINATION. DOWN RANGE OBSERVER LOCATION,
by William J. Schultis and Orlando E. Katter, Jr.
23 Aug 60, 14p. M1
Unclassified report

Descriptors: *Guided missile ranges, *Guided missile detection, Detection, Sensitivity, Trigonometry, Mathematical prediction, Equations, Site selection, Trajectories.

In order to better control the results of the experiments conducted downrange, it is necessary to find, for a particular firing, the optimum location of the ship and aircraft. A method for determination of these optimum observing positions, together with a knowledge of the range squared to the target when it is at an altitude of interest is presented. From the information given one may also determine the target steradiance required in order that an instrument of known sensitivity could detect it. (Author)

AD-404 259 Div. 12, 32
(TISTA/GEC) OTS price $4.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
METEROIDS AS A POSSIBLE HAZARD TO SPACE VEHICLE OPERATIONS: AN ANNOTATED BIBLIOGRAPHY,
comp. by Charles G. Gros. May 63, 41p. 3 35 63 1; SB63 1
Contract AF04 647 787
Unclassified report

Descriptors: *Space flight, Bibliographies, Space environmental conditions, Aviation safety, Astronautics, Hazards, Meteorites.

A bibliography is presented of meteoroids as a possible hazard to space vehicle operations. Citations to meteors and other interplanetary debris have been included when the material was

of relevance to meteoroids as well. Citations to combined environmental parameters affecting the reliability of space vehicles in flight have also been included when meteoroids constituted one of the parameters. The period covered is from 1956 through 1962, with a few earlier citations. (Author)

AD-404 276 Div. 12
(TISTW/MC) OTS price $3.60

Boeing Co., Seattle, Wash.
WS-133B MASTER SPECIFICATION INDEX,
by D. M. Polinsky. 14 May 63, 1v. D2 9143 2
Contract AF04 694 266
Unclassified report

Descriptors: *Guided missiles (Surface to surfsce), Ground support equipment, Strategic weapons, Launch vehicles (Aerospace), Specifications, Maintenance equipment.

AD-404 314 Div. 12
(TISTW/MC) OTS price $2.60

Boeing Co., Seattle, Wash.
CTLI FLIGHT ARTICLE MASS PROPERTIES REPORTS FOR WING I MRCN 6301 S/N 0000016 AND ON,
by Vincent Foster. 23 Apr 63, 24p. D2 13943 1
Contract AF04 694 46
Unclassified report

Descriptors: *Guided missiles (Surface-to-surface), Weight, Strategic weapons, Load distribution.

AD-404 377 Div. 12
(TISTA/LSK) OTS price $10.50

Boeing Co., Seattle, Wash.
FLIGHT ARTICLE MASS PROPERTIES REPORT FOR MINUTEMAN WING I COMPONENTS. MISSILES 661-705,
by Fred W. Sladen. 19 Apr 63, 133p. D2 13944 661
Contract AF04 694 46
Unclassified report

Descriptors: *Guided missiles (Surface to surface), *Guided missile components, Tables, Weight.

This report contains mass property summaries of the Boeing components for a series of Operational Wing I Minuteman missiles. The serialized components included in the data for each missile are those committed to that particular missile during the course of production in Seattle and may not be the ones finally installed during missile assembly at Air Force Plant 77. The data presented in this report consist of (1) sectional summaries of the total Boeing weight responsibility for each missile covered by this report, (2) a sectional summary of the components whose mean weights are used in lieu of actual weights, (3) summary check lists by missile section, (4) a list of Engineering Change Proposals incorporated on the hardware included in this report, and (5) actual weighing records for the interstages, the aft skirt, and the base heat deflectors. (Author)

AD-404 609 Div. 12
(TISTP/FEM) OTS price $18.00

Boeing Co., Seattle, Wash.
REPORT ON THE FLIGHT PROOF TESTING OF HYY-CAL C-1115-30-XXX-YYY CALORIMETERS FOR MINUTEMAN R&D MISSILES,
by R. B. Thorn. 2 May 63, 118p. T2 2576
Contract AF04 647 289
Unclassified report

Descriptors: *Calorimeters, Guided missiles, Vibration, Humidity, High temperature research, Launching, Tests, Pressure, Flight testing.

The Flight Proof Test results for the Hy-Cs C-1115-A-30 calorimeter are reported. This instrument will not go into production use, being replaced by the Hy-Cal C-1115-B-30 calorimeter. Section 2 of this document reports the Flight Proof Test results for the Hy-Cal C-115-B-30 calorimeter. These calorimeters are patterned after the asymptotic types developed by Boeing. The Model C-1115-B-30 calorimeter was qualified in that it passed all flight proof tests, and will be used on production missiles. (Author)

AD-404 659 Div. 12, 30
(TISTP/JW) OTS price $1.10

System Development Corp., Santa Monica, Calif.
OPERATING INSTRUCTIONS FOR THE AUGMENTED TRACKING STATION SIMULATION PROGRAM (SIMSTN) - MILESTONE 7.
28 Mar 63, 9p. TM L734 033 00A
Contract AF19 628 1648
Unclassified report

Descriptors: *Satellite networks, Tracking, Simulation, Programming (Computers).

Changes to 'Operating Instructions for the Augmented Tracking Station Simulation Program SIMSTN Milestone 7', dated 20 February 1963 are presented. (Author)

AD-404 666 Div. 12, 19, 8
(TISTP/MH) OTS price $2.60

Aerospace Corp., Los Angeles, Calif.
ELECTRONICS RESEARCH PROGRAM. SATELLITE ALTITUDE CONTROL SYSTEM EXPERIMENTS.
Semiannual technical rept., 1 July-31 Dec 62,
by A. J. Schiewe and J. G. Zarembo. 21 Mar 63, 23p. TDR169 3250 32TR1
Contract AF04 695 169
SSD TDR63 56 Unclassified report

Descriptors: *Satellite attitude, Attitude control systems, Satellites, Jets, Gases, Horizon scanners, Inertial guidance, Spacecraft, Simulation, Control.

A satellite attitude control system utilizing a digitally controlled gas jet scheme is being investigated. Progress during the period 1 July 1962 through 30 December 1962 was achieved primarily in the completion of the design and development of special purpose test equipment and in hardware implementation of the attitude control system. (Author)

AD-404 698 Div. 12, 30
(TISTE/OHD) OTS price $2.60

System Development Corp., Santa Monica, Calif.
SCHOPS/SWITCH CONTROL INTERFACE DOCUMENT,
by B. J. Cline and M. A. Franks. 15 Apr 63, 23p.
TM832 000 02
Contract AF19 628 1648

Unclassified report

Descriptors: *Programming (Computers), *Satellite networks, Radio communication systems, Switching circuits, Scheduling, Control systems, Programming.

Supersedes the SCHOPS/Switch Control Interface Document, TM(L)-832/000/01, dated 1 March 1963. Describes SCHOPS as a scheduling program designed and written for the CDC 1604, which allocates the use of specified pieces of equipment or equipment complexes at the Satellite Test Annex (STA) and remote tracking stations for specific tasks on a temporal basis.. Reports that performing this function, SCHOPS assists the System Controller (SC) in the resolution of conflicts in demands for specific equipment and provides other necessary information for implementing the control of this equipment. Also states that primary product of SCHOPS (Scheduling allocations for a prescribed scheduling period. (Author)

13. INSTALLATIONS AND CONSTRUCTION

AD-403 662 Div. 13, 12, 14, 22
(TISTP/JEA) OTS price $4.60

Picatinny Arsenal, Dover, N. J.
ANALYSIS OF CERTAIN ASPECTS OF PROTECTIVE WALL DESIGN,
by Leon W. Saffian and Richard M. Rindner.
Feb 63, 46p.
PA TM1063 Unclassified report

Descriptors: *Concrete, *Structural properties, *Protective covering, *Explosion effects, Reinforced concrete, Design, Construction, Load distribution, Loading (Mechanics), Standards, Pressure, Effectiveness, Reinforcing materials, Safety, Rocket propellants, Energy, Storage, Explosive materials, Silos.

Two aspects of the Picatinny Arsenal program for establishment of safety design criteria are discussed. Each is concerned with optimization of cubicle-type protective structures for manufacture and storage of explosives and/or high energy propellants. The first aspect considers the relative protection effectiveness of different construction materials. The second part deals with determination of optimum explosive charge distribution, within a cubicle, for minimization of explosion effects. Illustrative examples are presented for each case. Since this presentation in August 1962, certain revisions were made to the relationships defining blase reflection factors used in the illustrative examples. Based on these revisions, reflection effects as described in this paper are conservative. These revisions do not alter the design principles originally discussed. (Author)

AD-404 204 Div. 13, 30, 25
(TISTE/JBM) OTS price $1.60

Defense Research Lab., U. of Texas, Austin.
(No title).
Progress rept. no. 2, 1 Jan-31 Mar 63.
31 Mar 63, 14p.
Contract NObs88181, Proj. S F013 11 01, Task 1359
Unclassified report

Descriptors: *Pipes, *Acoustic impedance, *Special purpose computers, *Acoustic filters, *Mechanical properties, Electroacoustic transducers, Analog computers, Liquids, Instruction manuals, Programming computers, Hydrophones, Frequency, Automatic, Measurement, Acoustic properties.

Efforts were continued on the construction of an electrical analog device to plot automatically acoustical and mechanical impedances. Measured values of acoustic impedance of a resistive acoustic termination unit are given for the complete unit and for the unit in various stages of disassembly. The desired impedance magnitude for the complete unit prevailed at only two frequencies within the range of measurement. Findings of tests to check an impedance head hydrophone are reported. Results of two different, but related, hydrophone calibration methods were in disagreement by about 3 dB. Use of acoustic admittance parameters of pipe fittings, flow line irregularities, and acoustic filter branch elements in transforming acoustic load admittances toward the source past lossless elements is discussed. (Author)

AD-404 217 Div. 13, 8
(TISTE/JWS) OTS price $2.60

Rome Air Development Center, Griffiss Air Force Base, N. Y.
THE USAF ANTENNA PROVING RANGE.
Interim rept.,
by Martin Jaeger. Nov 62, 19p.
Proj. 4506, Task 450604
RADC RAL TM62 5
Unclassified report

Descriptors: *Ranges (Establishments), *Test facilities, Test methods, Test equipment (Electronics), Buildings, Antenna masts, Antenna feeds, Radio transmitters, Radio receivers, Parabolic antennas, Radar antennas, Recording systems, Antennas.

The present status of the instrumentation and operation of the USAF Antenna Proving Range, Newport, New York is described. A general description of the antenna test facility is presented, emphasizing improvements accomplished since the last report, and future planning for instrumentation to enable precise and accurate measurement of extremely narrow-beam, high-gain development and production-type antennas. Efforts expended on major antenna measurement programs are discussed as well as in-the-house studies and investigations. (Author)

AD-404 279 Div. 13, 18, 20
(TISTE/OHD) OTS price $7.60

Radiation Applications, Inc., Long Island, N. Y.
AN EVAPORATOR TYPE RADIOACTIVE LIQUID WASTE CONCENTRATOR WITH DISPOSABLE VESSEL,
by Eliezer Rubin, Arye Reisser, and Algird Karalis. 5 Mar 63, 69p.
Contract DA18 108cm17196
Unclassified report

Descriptors: *Radioactive waste, Evaporators, Liquids, Mobile, Containers, Steam, Disposal.

This report presents the detailed design specifications and operating instructions for a prototype evaporation unit with disposable vessel for concentrating radioactive liquid wastes. The design is based on the use of drums as evaporation vessels so adapted that the feed inlet, vapor outlet, steam connections, and liquid level control are detachable permitting the drums to be detached from the rest of the equipment and shipped for land disposal. The complete evaporation unit is portable, automatically controlled and has operating requirements for a supply of 80-150 psi steam for the evaporator, cooling water for the condenser, and electricity for operation of the pumps and controls. Table 1 lists the general specifications of the unit. (Author)

AD-404 483 Div. 13
(TISTP/JW) OTS price $12.50

Army Engineer Waterways Experiment Station, Vicksburg, Miss.
APPROACH ROADS GREENLAND 1956-1957 PROGRAM.
Apr 63, 154p.
AEWES TR3 505; 2 Unclassified report

Descriptors: *Roads, *Polar regions, Civil engineering, Climatology, Glaciers, Construction.

Progress is described on development of methods, techniques, and criteria for constructing roads on glacial ice surfaces and adjacent ice-free terrain. Terrain, weather, ice movement, ice ablation, meltwater flow, performance of road

fills, subsurface temperatures, and thaw penetration were studied. Soil properties and physiography of an area about 15 miles square near Camp TUTO were investigated to obtain data on sources of borrow materials and other data needed in design of roads, building foundations, etc. Road construction was primarily a continuation of that begun previously, with the objectives of making existing roads more useful and investigating several proposed designs. An 80-ft-long, wooden-pile-bent bridge was constructed on the ice by 6 men in 2-1/2 weeks; it supported the heaviest mobile equipment used and performed satisfactorily for 1-1/2 thaw seasons. (Author)

AD-404 524 Div. 13
(TISTP/FR) OTS price $4.60

Naval Civil Engineering Lab., Port Hueneme, Calif.
EMPLACEMENT OF THE FIRST SUBMERSIBLE TEST UNIT ON THE SEA FLOOR ONE MILE DEEP.
18 Feb 63, 37p.
NCEL TN N458

Unclassified report

Descriptors: *Test equipment, Ocean bottom, Mooring, Cables (Mechanical), Buoys, Materials, Sea water, Tests.

The criteria for a suitable study site, the locating techniques used for establishing its accurate position, and the installation of a 3-1/2-ton Submersible Test Unit (STU) containing engineering materials specimens (metallic and nonmetallic) at the selected site are described. The behavior of plastic ropes under load and special procedures dictated by their use are discussed. The precautions taken to assure retrieval of the STU are presented in detail. The collection of environmental data is decribed. (Author)

14. MATERIALS (NON-METALLIC)

AD-403 523 Div. 14
(TISTM/PCR) OTS price $5.60

Douglas Aircraft Co., Inc., Long Beach, Calif.
SONIC FATIGUE DAMPING MATERIAL DEVELOPMENT.
Quarterly rept. no. 3, 21 Dec 62-21 Mar 63, by P. H. McGowan and J. M. Snider. 1 Apr 63, 53p. LB31046, suppl. 2
Contract NOw62 0171

Unclassified report

Descriptors: *Damping, *Sonic fatigue, Composite materials, Aluminum, Glass, Vibration, Coatings, Creep, Viscoelasticity, Tables, Epoxy plastics, Nylon, Vinyl plastics, High temperature research, Low temperature research, Materials.

Damping compounds were modified by the addition of aluminum or glass flakes of various sizes, and the effect, as measured by the changed damping factor of a vibrating strip, was determined. The addition of either material improved the damping, but the ratio of one part flakes to two parts base appears most efficient. A temperature of -65 F had little effect while an increase of temperature to 180 F greatly reduced the damping properties. Two layer composite coatings were investigated and proved to be very effective but had a weight greater than the single coatings by 50% to 100%. (Author)

AD-403 652 Div. 14, 4
(TISTM/EJH) OTS price $2.60

Stanford Research Inst., Menlo Park, Calif.
ACCELERATED DETERIORATION OF ELASTOMERS.
Quarterly progress rept. no. 3, 1 Feb-1 May 63, by Frank R. Mayo, Kurt Egger, Jorge Heller and Katherine Crawford. 8 May 63, 19p.
Contract DA18 108cm17216, SRI Proj. PMU4204

Unclassified report

Descriptors: *Decomposition, *Synthetic rubber, *Oxidation, *Polymers, *Organic compounds, Solutions, Rubber, Elastomers, Degradation, Catalysis, Catalysts, Metalorganic compounds, Reaction kinetics, Oxygen, Peroxides, Iron compounds, Cobalt compounds, Manganese compounds, Nickel compounds, Copper compounds, Lead compounds, Zinc compounds, Calcium compounds.

The object of this research is to find ways to degrade elastomers rapidly at or near room temperature. This has led to the study of effects of soluble metal salts, hydrazines and thiols on rates of oxidation and chain scission of polyisoprene. The metal compounds examined have no significant pro-oxidant effect in the absence of oxidation products (peroxides). With partially oxidized polyisoprene, however, these same metal compounds show pronounced pro-oxidant effects. Most metal octanoates and naphthenates catalyze the decomposition of rubber hydroperoxides. The proportion of chain cleavage and the rate of chain initiation vary with the metal. Thus, cobalt and manganese salts cause most rapid disappearance of peroxides but the former strongly accelerates oxidation while the latter does not. Iron gives the most chain scissions for the peroxide decomposed, and about double the oxidation rate with 0.005 M ABN (2,5-azobis(2-methylpropionitrile)). Nickel, copper, lead, zinc, and calcium salts have little or no effect on the rate of oxidation.

AD-403 659 Div. 14, 8, 17
(TISTM/PCR) OTS price $9.60

Raytheon Co., Waltham, Mass.
INVESTIGATION OF THE MICROWAVE PROPERTIES OF FERROELECTRICS.
Final rept., 20 Jan 61-19 Jan 63, by B. D. Silverman, R. I. Joseph, and W. Winter. 19 Jan 63, 15p. S528
Contract AF19 604 8005, Proj. 4600, Task 460003
AFCRL 63 96

Unclassified report

Descriptors: *Ferroelectric materials, Dielectric properties, Nonlinear systems, Electrostriction, Theory, Temperature, Operators (Mathematics), Optical properties, Vibrations, Low-temperature research, Strontium compounds, Titanates, Tantalum compounds, Potassium compounds, Barium compounds, Lead compounds, Calcium compounds, Tin compounds, Zirconium compounds, Stannates, Hafnium compounds, Ferrites, Mathematical analysis, Microwave equipment.

A systematic and fundamental study was made of the microwave properties of ferroelectric materials with the perovskite structure. The quantities singled out for investigation are nonlinear dielectric constant, microwave losses and electrostriction. The comparison between theory and experiment is discussed. (Author)

AD-403 695 Div. 14, 26
(TISTM/AW) OTS price $2.75

Boeing Co., Seattle, Wash.
DEVELOPMENT OF DESIGN CRITERIA FOR A DRY FILM

LUBRICATED BEARING SYSTEM.
Final rept. 1 June 60-30 Nov 62,
by M. E. Campbell and J. W. Van Wyk. Mar 63,
142p.
Contract AF33 616 7395, Proj. 8128, Task 812801
ASD TDR62 1057
Unclassified report

Report on Power Conversion and Transmission Technology.

Descriptors: *Bearings, *Lubricants, Films, Ball bearings, Roller bearings, Powder metals, Composite materials, Low-pressure research.

The extent to which dry lubricant films could be used in future bearing systems for electrical accessory applications was determined. In Phase I, twenty each, dry film lubricated 20 millimeter bore, plain, ball and roller bearings were tested in 900 F air at 15,000 rpm with a 75 pound radial and a 25 pound axial load. All available bonded dry film lubricant coatings were applied to the bearings and tested. None were satisfactory. Two different bearing designs, which used an unconventional dry film lubrication technique, demonstrated the feasibility of operation at 15,000 rpm in 900 F air. In Phase II, roller and ball bearings were evaluated through the temperature range 70 to 1500 F at 15,000 rpm in a vacuum. The vacuum levels attained ranged between 5 x 10 to the minus 4 power mm Hg to 5 x 10 to the minus 6 power mm Hg. The initial tests in vacuum conducted on the two successful Phase I bearing designs resulted in early failures. These tests showed that the dry film lubricants, which were satisfactory in air, were entirely inadequate for vacuum operation. Therefore an investigation was initiated to develop new materials which would provide dry film lubrication under vacuum conditions. Over 400 compositions of dry lubricant and metal powders were fabricated using powder metallurgy techniques. Friction, wear, thermal expansion and fracture strength of these materials were determined. (Author)

AD-403 696 Div. 14
(TISTM/PCR) OTS price $1.25

Houdry Process and Chemical Co., Linwood, Pa.
AN INVESTIGATION OF PHYSICAL PARAMETERS OF NON-ELECTRICALLY CONDUCTING FINE PARTICULATES.
Final rept., Mar 61-Sep 62,
by D. W. Koester, E. B. Cornelius, and J. J. Donovan. Mar 63, 43p.
Contract AF33 616 8032, Proj. 7350, Task 735001
ASD TDR62 843 Unclassified report

Report on Refractory Inorganic Nonmetallic Materials.

Descriptors: *Particles, *Ceramic materials, *Sintering, Magnesium compounds, Oxides, Carbonates, Oxygen, Adsorption, Carbon dioxide, Decomposition, Nitrogen, Water, Gravimetric analysis, Exchange reactions, High temperature research, Mechanical properties.

The objective of this research is to find one or more measurable properties of active ceramic powders which can be related to sinterability. Samples of active magnesia were prepared by calcination of basic carbonate at 400-900 C. and tested for activity in a closed system. The activity measurements, oxygen exchange and 'initial specific adsorption' (of CO2), indicate that the bulk structure as well as the surface of such materials is extremely active. Both of these tests show that magnesia samples calcined at about 500 C. have higher activity than similar samples calcined at either higher or lower temperatures. There are indications that these measurements can be used to characterize ceramic materials with respect to their sinterability. Data from decomposition experiments and CO2 adsorption studies are presented and discussed. These results emphasize the difficulties involved in the preparation of uniform, large-scale lots of activated powders, and the care required in their handling to avoid inadvertent contamination by adsorption of atmospheric constituents (H2O and CO2). (Author)

AD-403 705 Div. 14, 8
(TISTM/PCR) OTS price $8.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
EMBEDDING MATERIALS FOR MODULAR ASSEMBLIES: A PARTIALLY ANNOTATED BIBLIOGRAPHY,
comp. by C. M. Pierce. Mar 63, 90p. 3 80 62 29; SB62 64
Contract NOrd17017
Unclassified report

Descriptors: *Embedding substances, *Bibliographies, Modules (Electronic), Containers, Plastics, Epoxy plastics, Isocyanate plastics, Catalysts, Dielectric properties, Electrical properties, Electronic equipment.

Modular packaging of electronics assemblies is a means of enhancing the dependability of equipment which is designed to operate in extreme environments. The proper selection of a plastic embedding material for a particular situation is, therefore, an important aspect in the design of dependable modules. The primary purpose of this bibliography is that of providing information on materials which can be utilized for the embedment of electronics assemblies. References are arranged alphabetically by author. Separate indexes for corporate author, secondary author, and subject are included at the end of the bibliography. The period of coverage dates from 1950 through June 1962. The search was completed in August 1962. (Author)

AD-403 715 Div. 14, 17
(TISTM/BRW) OTS price $2.50

Little, Arthur D., Inc., Cambridge, Mass.
KINETICS OF OXIDATION OF REFRACTORY METALS AND ALLOYS AT 1000-2000 C.
Final rept., Sep 59-July 62,
by J. B. Berkowitz-Mattuck. Mar 63, 107p.
Contract AF33 616 6154, Proj. 7350, Task 735001
ASD TDR62 203, pt. 2 Unclassified report

Report on Refractory, Inorganic and Non-Metallic Materials.

Descriptors: *Copper, *Carbides, *Silicides, *Oxidation, Reaction kinetics, Chromium compounds, Hafnium compounds, Molybdenum compounds, Niobium compounds, Tantalum compounds, Titanium compounds, Tungsten compounds, Vanadium compounds, Zirconium compounds, Intermetallic compounds, Thermal conductivity, High-temperature research, Low-pressure research, Test equipment, Helium, Oxygen, Refractory materials, Carbon compounds, Carbon dioxide, Monoxides.

An apparatus for continuous measurement of the oxidation rate of metallic materials between 900 and 2100 C is described. The samples, enclosed in an all-glass constant pressure flow system, are heated inductively, and a thermal conductivity cell is used to compare the oxygen concentration in a helium stream before and after removal of a portion of the oxygen by reaction with the heated specimens. For the highest carbides of the metals of Groups IV-A, V-A, and VI-A of th

periodic table, the results of calculations of the pressures of CO and CO2 over an equilibrium mixture of metal carbide and the corresponding metal oxide are given. Oxidation of Mo3Si, Mo5Si3, and MoSi2 between 1300 and 2100 K at oxygen pressures of 2-20 Torr was studied by oxygen consumption and metallographic techniques. The oxidation of W5Si3 and WSi2 was studied by the thermal conductivity method at temperatures between 1600 and 2030 K. A measurement of the rate of oxygen consumption of Ta2Be17 was made at 1664 K and an oxygen partial pressure of 8.4 Torr. (Author)

AD-403 795 Div. 14
(TISTM/PCR) OTS price $1.60

Smith, A. O. Corp., Milwaukee, Wis.
GLASS SURFACE CHEMISTRY FOR GLASS FIBER REINFORCED PLASTICS.
Progress rept. no. 14, 1 Apr-30 Apr 63.
30 Apr 63, 11p.
Contract NOw62 0679c
Unclassified report

Descriptors: *Glass, *Glass textiles, *Epoxy plastics, Tensile properties, Aging (Materials) Degradation, Sea water, Laminated glass, Laminated plastics, Stresses, Surface properties, Bonding.

Owens-Corning's HTS finish on E glass continued to compare favorably to successful coupling agents, such as A-1100. The HTS samples have been on flat plate test in 190 F water for 35 days. In miscellaneous bond life studies, it was found that (1) a 190 F 100% R. H. environment appeared more severe than immersion in 190 F water, (2) synthetic sea water behaved similar to distilled water, and (3) extrapolations of bond life data indicated that room temperature water would require an estimated 45 years to cause complete debonding of A-1100 treated E glass laminates. (Author)

AD-403 799 Div. 14, 27
(TISTM/EJH) OTS price $4.60

Atlantic Research Co., Alexandria, Va.
DEVELOPMENT OF FLEXIBLE POLYMERS AS THERMAL INSULATION IN SOLID-PROPELLANT ROCKET MOTORS.
Quarterly progress rept., 1 Jan-31 Mar 63,
by T. R. Walton, E. B. Simmons, and R. O. Thomas.
Apr 63, 36p.
Contract DA36 034ORD3325
Unclassified report

Descriptors: *Thermal insulation, *Heat resistant polymers, *Epoxy plastics, *Combustion chamber liners, Rocket cases, Rocket motors (Solid rocket propellants), Solid rocket propellants, Tests, Elasticity, Mechanical properties, Polymers, Asbestos, Materials.

The mechanical properties of several unfilled and asbestos-filled resins were determined. The elongations of three unfilled epoxy resins varied from 160 to 510% while the elongations of three abestos-filled epoxy resins varied from 1.9 to 6.3%. An asbestos-filled polyurethane resin had an elongation of 17%. Except for the filled epoxy resin with an elongation of 1.9%, these materials have adequate ductility for service requirements. Six motor firings were made this report period in which several asbestos-filled epoxy and polyurethane resins were evaluated. The best performing material was the Epon 828-tetrahydrophthalic anhydride-castor oil formulation filled with 40% of long-fiber asbestos. The char rate of this material in several motor firings, varied from 1.5 to 2.7 mil/sec (average of six samples was 2.0). The 40%-castor oil-modified Guardian filled with 40% long fiber asbestos has also continued to perform well. The best performing polyurethane resin gave char rates of 2.5 and 2.3 mil/sec in two different motor firings. All three of these materials show better insulation performance than the best commercially available materials. (Author)

AD-403 800 Div. 14, 8
(TISTE/CRJ) OTS price $10.10

Caswell Electronics Corp., San Jose, Calif.
APPLICATION OF FERROELECTRIC MATERIALS TO MICROWAVE CIRCUITS.
Final rept.,
by Robert L. Orrick, Jr. Oct 62, 35p.
Contract AF30 602 2240
RADC TDR62 538
Unclassified report

Descriptors: *Ferroelectric materials, *Microwave equipment, Ceramic materials, Ferromagnetic materials, Microwave networks, Coaxial cables, Waveguides, Phase shifters, Transmission lines, Dielectric properties, Electric fields, Temperature, Theory, Production, Optical properties.

A theory to describe the behaviour of a reactively terminated transmission line is presented. The experimental data is in good agreement with the theory. Phase shifts of 100 degrees per db loss were achieved in this type of device using commercially available ferroelectrics. A transmission phase shifter using two reactively terminated phase shifters and a 3 db hybrid was made and tested. Fifty five degrees phase shift with 0.9 db loss was obtained. A theory describing a tunable travelling wave filter is discussed and some experimental data is presented. A description of two methods of making dielectric constant measurements is reviewed and experimental results are given. An investigation of colemanite is described. It is concluded that commercially available ferroelectric materials have relatively high loss tangents and that for this reason the phase shift to loss ratio of ferroelectrics is almost one order of magnetitude lower than that of ferrites. Moderately good phase shifters can be made in coaxial lines in very small sizes. Direct transmission phase shifters suffer because of difficult matching problems. (Author)

AD-403 821 Div. 14, 4
(TISTM/TCG) OTS price $.75

Wyandotte Chemicals Corp., Mich.
SYNTHESIS OF LOW TEMPERATURE OIL RESISTANT URETHANE ELASTOMERS.
Quarterly progress rept. no. 3, 1 Jan-31 Mar 63,
1 Apr 63, 17p.
Contract DA20 018ORD24883
Unclassified report

Descriptors: *Elastomers, *Isocyanate plastics, *Synthetic rubber, *Organic compounds, Mechanical properties, Plasticizers, Stresses, Tensile properties, Molecular weight, Oils, Stability, Compatibility, Polymerization, Mixtures, Synthesis (Chemistry), Low-temperature research.

Urethane and urethane-urea elastomers were prepared and their properties evaluated. The low temperature flexibility specification was met for the first time. This elastomer was prepared by using diol triol blends which serve as mutual plasticizers reducing the crystallinity of the individual polyols at low temperatures. This approach has produced elastomers with the best low temperature properties. The diol components had a major effect on lowering torsional

modulus at -55 C. The type of diisocyanate was varied on a 4500-molecular-weight polyether triol (Pluracol TPE 4542)-o-dichlorobenzidene (DCB), 1/1 NH2/OH ratio elastomers. Quasi prepolymers were prepared for this diisocyanate study in order to obtain liquid diisocyanate components. Properties varied considerably with variation of the diisocyanate. Urethane elastomers containing no urea linkages were evaluated and compared to similar elastomers containing urea linkages. (Author)

AD-403 827 Div. 14, 26
(TISTM/SJR) OTS price $3.00

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
HOLLOW GLASS FIBER REINFORCED PLASTICS,
by B. Walter Rosen, A. E. Ketler, Jr. and Zvi Hashin. May 63, 160p. R63SD41
Contract NOw61 0613d
Unclassified report

Descriptors: *Phenolic plastics, *Glass textiles, *Composite materials, Processing, Tensile properties, Compressive properties, Acoustic properties, Structural properties, Electrical properties, Elasticity, Shear stresses, Reinforcing materials.

A program to evaluate the improvement in bulk properties obtained by utilizing hollow glass fibers as the reinforcing material for glass-plastic composites was conducted. Controlled fabrication of fibers and uniaxially stiffened composites was demonstrated. Mechanical, electrical and physical properties were determined experimentally. Mechanical performance was defined analytically. The hollow glass fiber composites were shown to have improved structural efficiency for applications where stiffness or compressive strength is the governing structural criterion. (Author)

AD-403 874 Div. 14, 8, 25
(TISTE/CAM) OTS price $6.60

Purdue U., LaFayette, Ind.
SEMICONDUCTOR RESEARCH.
Semiannual rept. 1 Oct 62-31 Mar 63.
31 Mar 63, 35p.
Contract DA31 124AROD17
Unclassified report

Descriptors: *Semiconductors, *Germanium alloys, *Antimony alloys, *Intermetallic compounds, Electrical properties, Optical properties, Magnetic properties, Low temperature research, Thermal conductivity, Thermoelectricity, Infrared radiation, Oxygen, Absorption, Measurement, Hyperfine structure, Theory, Crystals growth, Paramagnetic resonance, Silicon, Germanium, Zinc compounds, Tellurides, Scientific research.

Contents:
Electrical properties
Hot carrier distribution function: experimental determination, description, and application
Oscillatory magnetoresistance of GaSb
Galvanomagnetic effects in heavily doped p-type germanium
Piezoresistance of n-GaAs
Optical properties of III-V semiconductor compounds
Infrared absorption of oxygen in silicon and germanium under high resolution
Irradiation effects
Electron paramagnetic resonance in silicon and germanium
Low temperature studies
Specific heat of lead between 0.3 and 4 k.
Thermal conductivity
General
X-ray lattice parameter
Growth of single crystals of zinc telluride

AD-404 023 Div. 14, 25
(TISTM/AW) OTS price $4.60

E. I. Du Pont de Nemours and Co., Inc., Wilmington, Del.
THERMOELECTRIC PROPERTIES OF SELENIDES AND TELLURIDES OF GROUPS VB AND VIB METALS AND THEIR SOLID SOLUTIONS.
Quarterly rept. no. 6, 1 Oct-30 Dec 62,
by W. T. Hicks and H. Valdsaar. 8 Feb 63, 1v.
Contract Nobs84824, Proj. SR007 12 01, Task 802
Unclassified report

Descriptors: *Selenides, *Tellurides, *Semiconductors, Group VI elements, Group V elements, Tungsten alloys, Lead alloys, Encapsulation, Thermal conductivity, Thermoelectricity, Tantalum, Chemical reactions, Thermocouples, Resistance (Electrical), Electrical properties, Intermetallic compounds.

Improved procedures in synthesis and in measurements have eliminated unreproducibilities in tantalum-doped tungsten diselenide preparations, giving a well-substantiated Figure of Merit of about 0.5 x 10 to the minus 3 power/deg in the 500 to 1000 C range. An apparatus for direct efficiency measurements is under construction. It is planned to incorporate tantalum-doped tungsten diselenide (p-type) in a practical thermoelectric module, cascaded with p-type lead telluride and encapsulated in a ceramic-coated constantan can which will also serve as the n-leg of the couple. Experimentation with the details of construction is underway. (Author)

AD-404 058 Div. 14
(TISTM/PCR) OTS price $.50

Rock Island Arsenal Lab., Ill.
EFFECT OF CURE CONDITIONS ON WEAR LIFE AND CORROSION PROTECTION OF A RESIN-BONDED SOLID FILM LUBRICANT,
by F. S. Meade and G. P. Murphy. 26 Mar 63, 19p.
DA Proj. 1A 024401A107
RIAL 63 959 Unclassified report

Descriptors: *Coatings, *Lubricants, *Bonding, Aging (Materials), Steel, Sea water, Sprays, Corrosion inhibition, Films, Plastics.

A resin-bonded solid film lubricant was applied to grit blasted steel, zinc phosphatized steel, and preheated zinc phosphatized steel. The coating was then cured at temperatures from 200 to 500 F for times ranging from 10 to 180 minutes. The effect of these cure conditions on wear life and corrosion protection were determined. The following information was obtained from this investigation: (1) Grit blasted steel is inferior to the other two substrates. (2) At cure temperatures above 300 F, the resin-bonded solid film lubricant does not prevent the loss of water of hydration from the zinc phosphate coating and the resultant loss in corrosion protection. (3) No one set of cure conditions gives optimum wear life and corrosion protection. (4) Wear life increase with increasing cure time and temperature. (5) Corrosion protection increases with decreasing cure time and temperature. (6) Cure conditions depend on the application for which the resin-bonded solid film lubricant is to be used. (Author)

Division 14 - MATERIALS (NON-METALLIC)

AD-404 200 Div. 14
(TISTM/PCR) OTS price $2.60

Aerospace Corp., Los Angeles, Calif.
MATERIALS AND STRUCTURES, PHYSICAL MEASUREMENTS PROGRAM, PYROLYTIC GRAPHITE.
Semiannual technical rept., 1 Jan-30 June 62, by J. H. Richardson and E. H. Zehms. 1 Oct 62, 20p. TDR69 2240 64TR2
Contract AF04 695 69
DCAS TDR62 187

Unclassified report

Descriptors: *Graphite, Heat shields, Heat treatment, Microstructure, Stability, Grain structures (Metallurgy), Crystal structure, Photomicrography, Electron microscopy, High temperature research, Crystal growth, Density, X-ray diffraction analysis, Configuration, Pyrolysis.

Studies on pyrolytic graphite were made with respect to its possible use as a re-entry heat shield material. Preliminary work is reported on changes in x-ray parameters and physical dimensions caused by heat treatment above the temperature of deposition. Data are presented which indicate that the pyrolytic structure becomes similar to that of natural graphite after treatment to 3000 C. Initial studies on structural changes as a function of time are reported. (Author)

AD-404 228 Div. 14, 13, 30
(TISTM/PCR) OTS price $1.60

Naval Civil Engineering Lab., Port Hueneme, Calif.
BEHAVIOR OF INSTRUMENTED PRESTRESSED CONCRETE PAVEMENT AT NAS LEMOORE, CALIFORNIA,
by J. A. Bishop. 7 May 63, 13p. TR120
Proj. Y R011 01 013

Unclassified report

Suppl. to rept. no. TR120, AD-253 430.

Descriptors: *Reinforced concrete, *Pavements, *Runways, Strain gages, Instrumentation, Aging (Materials), Temperature, Humidity, Elasticity, Spallation, Photographs, Tables, Tests.

Instrumented couplers and Carlson strain meters are a satisfactory means of extracting data from the pavement. It would appear that after two years of life, however, and after many of the couplers are no longer providing data, that in future prestressed pavement work the trumpets or sheaths surrounding the instrumented couplers should be much longer than were used at NAS Lemoore to obviate the possibility of the coupler binding on a trumpet end when the prestressing tendons are stretched. (Author)

AD-404 240 Div. 14, 26
(TISTM/PCR) OTS price $1.10

Naval Civil Engineering Lab., Port Hueneme, Calif.
CHEMICAL WOOD PRESERVATIVE PLANT,
by J. W. Chapin. 7 May 63, 3p. TN468
Proj. Y R005 07 007

Unclassified report

Descriptors: *Wood, *Preservation, Chemicals, Creosote, Organic materials, Piers, Design, Industrial equipment, Processing, Operation, Temperature, Pressure, Vacuum apparatus, Heat treatment, Storage, Manufacturing methods, Production, Condensers (Liquefiers), Heat exchangers, Vacuum pumps, Pressure regulators, Safety valves, Cooling & ventilating equipment, Tanks (Containers), Control panels, Photographs, Industrial plants,

A small plant for treating marine piling was constructed at the Naval Civil Engineering Laboratory. Although primarily designed for creosote service, the plant is readily adaptable to other treatments and simulates equipment in use by commercial treating firms. Pre-service tests and initial operations indicate the treatment plant performs as expected and is ready for service applications. (Author)

AD-404 288 Div. 14
(TISTM/PCR) OTS price $3.60

Mellon Inst. of Industrial Research, Pittsburgh, Pa.
BALLISTIC PROTECTIVE BUOYANY MATERIALS.
Quarterly rept. no. 12, 1 Oct-31 Dec 62. 31 Dec 62, 34p.
Contract N140 138 72793, Proj. 4388 3

Unclassified report

Descriptors: *Fibers (Synthetic), *Buoyancy, Density, Angle of attack, Cellulose plastics, Dacron, Moistureproofing, Nylon, Ballistics.

An increase of approximately 50% in the buoyancies of hydrophobed needled felts has been made possible by the use of the compartmentation technique. It was determined that the buoyancy of a submerged hydrophobed batting increased as its angle to the water surface approached zero. A comparison of carded battings prepared from crimped and straight hydrophobed fine fibers has shown that those containing the crimped staples have superior buoyant and ballistic properties. In the preparation of needled batts, an increase in the amount of needling is generally accompanied by a decrease in buoyant and ballistic effectiveness. Carded batts are definitely superior to needled batts in body armors. Although 1.0 dpf Acrilan and 1.25 dpf Dacron fibers have approximately equal diameters, the Acrilan staple is more effective as a buoyant and ballistic filler. (Author)

AD-404 546 Div. 14, 26
(TISTM/AW) OTS price $1.60

Pasteur Inst. (France).
HYGROPHOTOGRAPHIC STUDIES ON THE PERMEABILITY OF PACKAGING MATERIALS TO WATER AND MOISTURE.
Final rept., 31 Jan 62-31 Jan 63,
by Joseph Sivadjian. 31 Jan 63, 17p. FTR3
Contract DA 91 591EUC2152

Unclassified report

Descriptors: *Packaging materials, *Plastics, Water vapor, Water, Steam, Vinyl plastics, Humidity, Photographic plates, Polyethylene plastics, Temperature, Test methods, Moisture.

The experiments at normal temperature were carried out by plunging a part of the preparations into liquid water contained in a desiccator and placing the other part on a support placed above in the atmosphere saturated by steam which covers the liquid. Difficulties were encountered in the preparation of bags by means of Tedlar and Saran films; it was impossible to obtain a vacuum by soldering with a flame. Accordingly, the experiments were carried out at normal atmospheric pressure. For the plastics which are sufficiently permeable to water, great differences were not noticed between the permeability to water and to steam in the zone of weak temperatures, differences which became less and less sensitive in proportion as temperature was increased. The two permeabilities became practically equal at the temperatures of 85 and 95 C (Tedlar and Profax), except for the Saran whose permeability to steam in this same zone of temperatures is clearly revealed less elevated than the permeability to water, due probably to the

profound modification undergone by the film at the contact of hot water. In the case of FEP, the differences of the two values remained constant, while for the plastic materials of low permeability to water, as the Kel-F, no difference was verified, their permeability to water being the same as their permeability to water vapor for all the temperatures studied. (Author)

AD-404 573 Div. 14, 4
(TISTM/EJH) OTS price $.50

Coating and Chemical Lab., Aberdeen Proving Ground, Md.
MEDIUM ALKALINITY CLEANERS OF SUPERIOR DETERGENCY,
by A. Mankowich. 16 Apr 63, 12p.
DA proj. 1 1 0 24401A110 05
APG CCL140
Unclassified report

Descriptors: *Cleaning compounds, *Organic compounds, Calcium compounds, Soaps, Additives, Sodium compounds, Chelate compounds, pH, Aircraft, Surfaces, Greases, Phosphates, Hydrates, Solutions, Tables, Lubricants.

The inefficiency of medium alkalinity (ca pH12), soak alkaline cleaners in deterging calcium soap-grease was overcome in two ways: by incorporating a small amount of the organic chelating agent, tetrasodium salt of ethylene-diaminetetra-acetic acid and causing removal by an exchange mechanism, or by the addition of a small amount of specific high boiling - high flash point glycols which produce stable, single phase detergent solutions possessing synergistic power. (Author)

AD-404 598 Div. 14
(TISTM/EJH) OTS price $1.10

General Dynamics Convair, San Diego, Calif.
MATERIAL - ELASTOMERS - TEFLON, NEOPRENE, TA-77 SYNTHETIC RUBBER (T. A. MANUFACTURING CORP.). AROMATIC FUEL AND WEATHERING RESISTANCE,
by H. Mark, J. C. George, and E. E. Keller.
19 Apr 60, 7p. 8926 155
Contract AF33 657 8926
Unclassified report

Descriptors: *Synthetic rubber, *Halocarbon plastics, Clamps, Ozone, High temperature research, Jet engine fuels, Mechanical properties, Tensile properties, Compatibility, Fluorides, Tests.

Suitable specimens of general purpose neoprene AMS 3209; aromatic fuel resistant neoprene AMS 3215; TA-77 synthetic rubber and teflon were subjected to various environmental tests. Atlas Type XW Weatherometer exposure for 250 hours and ozone exposures (ASTM Method 1149-55T) resulted in no cracking in the teflon and general purpose neoprene AMS 3209, but the T. A. synthetic rubber and aromatic fuel resistant neoprene AMS 3215 cracked. Heating at 212 F for 70 hours did not appreciably harden any of the four materials. Twenty-four hours immersion in JP4 fuel caused only very slight swelling of teflon, but the two neoprene materials and the TA-77 synthetic rubber swelled considerably as a result of immersion. (Author)

AD-404 616 Div. 14, 7
(TISTM/LMH) OTS price $2.25

Westinghouse Electric Corp., Pittsburgh, Pa.
MODULE IMPROVEMENT PROGRAM.
Final rept.
31 Aug 62, 1v.
Contract NObs84329
Unclassified report

Descriptors: *Power equipment, Thermoelectricity, Electric potential, Mechanical properties, Dielectric properties, Shock resistance, Inorganic compounds, Thermal stresses, Liquid metals, Metal coatings, Electric insulation, Materials.

Additional data primarily related to the continued testing of materials for use in power generator modules is presented. Effort is directed toward improvement of the life-performance of thermoelectric generator modules by means of engineering development and evaluation in the areas of insulation, material processing, and contacting. During the program, it became apparent that the life-performance of materials would be strongly influenced by the stresses imposed by operating conditions, and that life-performance would be directly dependent on the mechanical properties of the thermoelectric materials and contacts. The program was modified to include a stress analysis and the testing of mechanical properties of materials. At the conclusion of the program, average module life was 7500 hours for 25% power drop, with some module tests running in excess of 10,000 hours. Module efficiency has been improved to 7% for a smaller temperature gradient, which insures longer life. (Author)

AD-404 622 Div. 14, 33
(TISTM/AW) OTS price $3.60

Army Cold Regions Research and Engineering Lab., Hanover, N. H.
LABORATORY EVALUATION OF FROST HEAVE CHARACTERISTICS OF A SLAG - FLY ASH - LIME BASE-COURSE MIXTURE,
by C. W. Kaplar. Jan 63, 28p.
CRREL TR96 Unclassified report

Descriptors: *Roads, *Soils, Freezing, Permafrost, Soil mechanics, Polar regions, Mixtures, Slags, Materials.

Sixteen specimens of a slag-fly ash-lime base-course mixture were tested for frost susceptibility in the laboratory. The mixture consisted of 66% slag, 30% fly ash and 4% lime, by weight. Test results showed that oven-cured specimens heaved insignificantly even after 10 cycles of slow freezing in an open-system test, while non-cured specimens heaved about 15% during a single freezing and were classified to be of low frost susceptibility. In accordance with adopted criteria, based on average rate of heave in mm/day, most moist-cured and soaked specimens were classified as negligible frost-susceptible although a few approached or were classified as very low frost-susceptible. Specimens cured only in moist sand performed significantly better on the whole than those first submerged in water and then moist-cured. On 'moist-cured only' specimens, heaving decreased with increase in curing time. The maximum measured heave of any of the cured specimens, soaked or otherwise, during any one freezing cycle was about 0.2 in. and about 3.3%. (Author)

15. MATHEMATICS

AD-403 502 Div. 15
(TISTP/FEM) OTS price $1.60

Institute of Engineering Research, U. of Calif., Berkeley.
SPEARMAN'S FOOTRULE - AN ALTERNATIVE RANK STATISTIC,
by D. C. Kleinecke, H. K. Ury and L. F. Wagner.
Nov 62, 18p. CDRP182 114
Contract CD SR58 40
Unclassified report

Descriptors: *Statistical distribution, *Statistical processes, Numerical analysis, Monte Carlo methods, Statistical functions, Sampling, Stochastic processes.

A known but neglected rank statistic - Spearman's Footrule - is examined. Formulas are given for its mean and variance and the covariance with better known rank statistics. A very thorough numerical description is given, including the exact sampling distributions for up to ten ranks when all permutations are equally likely and approximate results up to twenty. The statistic appears to be asymptotically normal but this has not been proven. There are numerous applications for this statistic in non-parametric testing, but they are not discussed in this report. (Author)

AD-403 671 Div. 15
(TISTP/FEM) OTS price $1.10

Mathematics Research Center, U. of Wisconsin, Madison.
THE ATYPICAL ZEROS OF A CLASS OF ENTIRE FUNCTIONS,
by P. M. Anselone and R. P. Boas, Jr. Apr 63, 7p. TSR394
Contract DA11 022ORD2059
Unclassified report

Descriptors: *Functional analysis, Integral equations, Difference equations, Differential equations, Functions, Integrals, Statistical distributions.

A homogeneous differential-difference-integral equation with constant coefficients and a convolution integral has an exponential solution $\varphi(t) = e^{zt}$ if and only if z is the zero of a certain entire function. The asymptotic distribution of the zeros of such entire functions is discussed. (Author)

AD-403 674 Div. 15
(TISTP/MFA) OTS price $2.60

Israel Inst. of Tech., Haifa.
ON COMPACTIFICATION OF METRIC SPACES.
Final technical rept.,
by M. Reichaw (Reichbach). Feb 63, 23p.
Contract N62558 3315
Unclassified report

Descriptors: *Topology, Functions, Numbers, Transformations (Mathematics).

AD-403 693 Div. 15
(TISTP/FEM) OTS price $2.60

Mathematics Research Center, U. of Wisconsin, Madison.
TIED-DOUBLE-CHANGE-OVER DESIGNS,
by W. T. Federer and G. F. Atkinson. Apr 63, 26p. TSR391
Contract DA11 022ORD2059
Unclassified report

Descriptors: *Matrix algebra, *Analysis of variance, Experimental data, Sequences, Design, Numbers, Probability, Statistical functions, Vector analysis, Numerical analysis, Least squares method, Combinatorial analysis, Statistical analysis.

The construction and analysis for a class of experimental designs denoted as tied-double-change-over designs are presented. These designs are useful for situations wherein the treatments are applied in sequence to an experimental unit and where the effect of a treatment persists for one period after the period in which the treatment was applied; they allow estimation of direct and residual treatment effects. Tied-double-change-over designs are constructed utilizing one, two, ..., t - 1 orthogonal latin squares for t treatments. Although the analysis is for r rows and for c columns in general, particular attention is given to the case where r = tq + 1 rows and c = ts columns for sq = k(t - 1), for k a positive integer; explicit solutions are obtained for the situations where the first period results are omitted from the analysis and where the first period results are included. A numerical example is used to illustrate the application of the results to experimental data. (Author)

AD-403 717 Div. 15
(TISTP/FEM) OTS price $2.60

Mathematics Research Center, U. of Wisconsin, Madison.
POWER SERIES WHOSE PARTIAL SUMS HAVE FEW ZEROS IN AN ANGLE,
by J. Korevaar and T. L. McCoy. Apr 63, 21p.
TSR387
Contract DA11 022ORD2059
Unclassified report

Descriptors: *Taylor's series, Mathematical analysis, Integral equations, Inequalities, Equations, Partial differential equations, Functions, Polynomials.

AD-403 790 Div. 15
(TISTP/FEM) OTS price $9.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
NONLINEAR ORDINARY DIFFERENTIAL EQUATIONS: AN ANNOTATED BIBLIOGRAPHY,
comp. by George R. Evans. Mar 63, 107p.
2 32 62 3; SB62 54
Unclassified report

Descriptors: *Nonlinear differential equations, *Bibliographies, Fluid mechanics, Boundary layer, Nonlinear systems, Communication theory, Control systems, Theory, Topology, Differential equations.

The primary area of interest of the search is the existence and uniqueness of solution to ordinary differential equations for the following two classes of problems: initial value problems and boundary value problems. Also included are actual construction of solutions. Excluded are stability of solutions and equations with periodic solutions, or equations with periodic coefficients. Arrangement is chronological and the period covered is 1949-October 1962. It is suggested that for literature prior to 1949 the bibliography by da Silva Dias be consulted (Citation No. 18). Search was completed October 1962. (Author)

AD-403 836 Div. 15, 8
(TISTP/FEM) OTS price $2.60

Mathematics Research Center, U. of Wisconsin, Madison.
A NECESSARY CONDITION FOR WYE-DELTA TRANSFORMATION,
by Alfred Lehman. Mar 63, 24p. TSR383
Contract DA11 022ORD2059
Unclassified report

Descriptors: *Algebra, Mathematical logic, Networks, Resistance (Electrical), Vector analysis, Analysis of variance, Equations, Mathematical analysis, Theory, Transformations (Mathematics).

Let the binary operations $\cup$ and $\cap$ denote the arithmetic operations of addition ($a \cup b = a + b$) and reciprocal addition ($a \cap b = ab/(a + b)$), that is, $\cup$ and $\cap$ are the series and parallel combination rules for resistor networks. It is easy to verify that the identity (1) $(a \cup b \cup c) \cap ((a \cap b) \cup (a \cap c) \cup (b \cap c)) = (a \cap b \cap c) \cup ((a \cup b) \cap (a \cup c) \cap (b \cup c))$ holds. Furthermore if the binary operation $\cdot$ denotes arithmetic multiplication then the identity (2) $(a \cup b) \cdot (a \cap b) = a \cdot b$ holds. Now suppose only that $\cup$ and $\cap$ are associative commutative binary operations on an abstract set S and that there exists a commutative group R, $\cdot$ such that S is a subset of R and (2) holds on S. If in an abstract network theory $\cup$ and $\cap$ are the series and parallel combination rules and if wye-delta transformations are valid in this theory then it is shown that (1) must hold. Wye-delta transformations are valid for resistor networks but need not exist in resistor-inductor-capacitor (RLC) networks. Thus, in the presence of (2), identity (1) is a necessary but not sufficient condition for wye-delta transformation. (Author)

AD-403 917 Div. 15
(TISTM/PCR) OTS price $1.10

School of Aerospace Medicine, Brooks Air Force Base, Tex.
ANALYSIS OF REPEATED MEASUREMENTS WITH DISPROPORTIONATE SAMPLES FOR TREATMENTS IN A TWO-WAY CLASSIFICATION,
by Richard C. McNee and Phelps P. Crump. Dec 62, 7p.
SAM/B TDR62 149

Unclassified report

Descriptors: *Statistical analysis, *Analysis of variance, Medical research, Measurement.

A procedure is given for computing the analysis of variance obtained by fitting constants of the experimental setup where repeated measurements are made on subjects over time and treatments have a two-way classification with disproportionate subclass numbers. Under certain assumptions, this analysis gives a test of the three-factor interaction, tests of two-factor interactions if there is no three-factor interaction, and tests of main effects if there are no interactions. The advantage of this procedure over the standard procedure of fitting constants is in the amount of computation involved. (Author)

AD-404 104 Div. 15, 18
(TISTP/FEM) OTS price $2.60

System Development Corp., Santa Monica, Calif.
STOCHASTIC DUELS WITH LIMITED AMMUNITION SUPPLY,
by C. J. Ancher, Jr. 23 Apr 63, 24p. SP1017 001 00

Unclassified report

Descriptors: *Statistical analysis, *Game theory, Logistics, Ammunition, Statistical distributions, Probability, Integral equations, Functions, Stochastic processes, Kill probability, Cyclic rate.

In a previous paper the ground work was laid for a new theoretical model of combat called the stochastic duel. The principal elements of the model were fixed kill probabilities on each round fired, a random time between rounds fired and unlimited ammunition supply. This paper extends the solution to those more realistic cases of limited ammunition supply. The general solution (as a quadrature) is obtained and it is applied to several specific examples. The special case of finite, fixed ammunition supply is treated in some detail. (Author)

AD-404 113 Div. 15
(TISTP/FEM) OTS price $4.60

System Development Corp., Santa Monica, Calif.
CONFIDENCE BANDS IN STRAIGHT LINE REGRESSION.
by A. V. Gafarian. 17 Apr 63, 45p. SP1181 000 00

Unclassified report

Descriptors: *Polynomials, *Statistical functions, Partial differential equations, Real variables, Matrix algebra, Special functions, Statistical distributions, Geometry, Integral equations, Probability.

A method is developed for obtaining confidence bands in polynomial regression when the observations are independently distributed with constant but unknown variance. The bands may be obtained, in principle, over arbitrary sets of the independent variable with exact preassigned confidence coefficients. In general, difficult distribution problems result when specific applications are attempted. The major portion of this paper is concerned with first degree polynomials since some progress has been made here. A table is provided to obtain a constant width confidence band which contains the true by unknown straight regression line for values of the independent variable in some arbitrarily selected interval with an exact preassigned confidence coefficient. The present method is compared with the classical hyperbolic band for the whole regression line. (Author)

AD-404 257 Div. 15
(TISTP/MFA) OTS price $2.60

Columbia U., New York.
GROUPS OF HOMOTOPY EQUIVALENCES,
by Donald W. Kahn. 1962, 21p. CU13 57M.

Unclassified report

Descriptors: *Algebraic topology, Sequences, Groups (Mathematics), Theory.

Information on groups of homotopy equivalences is presented. The method is inductive, and it is connected with the Postnikov procedure of decomposing a space according to homotopy groups. Two different groups of homotopy equivalences are considered, the first being the ordinary one and the second being a quotient of it by those equivalences which induce the identity isomorphism on homotopy groups. In the absence of any structure theory for non-Abelian groups (which may possibly be infinitely generated), it seems impossible to determine these groups exactly. They can be determined, up to a series of extensions. (Author)

AD-404 423 Div. 15, 30
(TISTP/MFA) OTS price $1.10

Wisconsin U., Madison
REPORT TO THE OFFICE OF NAVAL RESEARCH ON WORK DONE UNDER CONTRACT NONR (G) 00099-62,
by Robert W. Gilmer, Jr. 1963, 5p.
Grant G00099 62

Unclassified report

Descriptors: *Research program administration, Abstracts, Mathematics, Theory, Algebra, Documentation.

Contents (abstracts):
Commutative rings containing at most two prime ideals
On a classical theorem of Noether in ideal theory
Integral domains with quotient overrings
Extension of results concerning rings in which every semi-primary ideal is a primary

Finite rings having a cyclic multiplicative group of units
The cancellation law for ideals in a commutative ring
Multiplication rings as rings in which ideals with prime radical are primary
Some elementary results on the ideal theory of commutative rings without identity

AD-404 457 Div. 15
(TISTP/MFA) OTS price $1.10

Washington U., Seattle.
INVARIANT DIFFERENTIAL SYSTEMS AND CANONICAL FORMS OF E. CARTAN,
by H. H. Johnson. 18 Apr 63, 7p. TR19
Contract Nonr47715, Proj. 043 186
Unclassified report

Descriptors: *Groups (Mathematics), *Transformations (Mathematics), Functions, Differential equations, Partial differential equations, Theory, Analysis.

One of the early applications of continuous transformation groups and pseudo groups was to invariant systems of ordinary and partial differential equations. Much of this work was done by S. Lie and E. Vessiot before Cartan's contributions to infinite continuous pseudo groups. The purpose of this paper is to develop parts of the older theory of Lie and Vessiot in Cartan's context. The essential role played by Cartan's canonical forms in determining invariant systems is demonstrated. Automorphic systems can be completely described in a manner similar to Lie's, but Cartan's involutiveness together with an additional hypothesis yield more complete results than in the older theory. Also, following Cartan the theory takes a 'coordinate-free' form. Definitions will be those of M. Kuranishi. It is assumed that manifolds, functions, and forms are real and infinitely differentiable. (Author)

16. MEDICAL SCIENCES

AD-403 504 Div. 16
(TISTB/AW) OTS price $3.60

Lovelace Foundation for Medical Education and Research, Albuquerque, N. Mex.
THE OVERPRESSURE-DURATION RELATIONSHIP AND LETHALITY IN SMALL ANIMALS.
Technical progress rept.
by D. R. Richmond, V. C. Goldizen, V. R. Clare and C. S. White. 10 Sep 62, 50p.
Contract DA49 146xz055
DASA 1325
Unclassified report

Descriptors: *Blast, *Wounds and injuries, Laboratory animals, Shock tubes, Shock waves, Time, Tolerances (Physiology).

A total of 993 mice, rats, guinea pigs and rabbits were exposed to sharp-rising overpressures of various short durations. They were mounted on a concrete pad above which high-explosive charges, ranging in weight from 0.50 oz to 64 lbs, were detonated. Pressure-time measurements were obtained with pencil-type and shock-tube piezo-electric gauges on the pad directly beneath the charges. The duration of the blast waves ranged from 0.40 msec to 6.8 msec. The LD50 pressures were calculated for each species at the different pulse durations. In general, the pressures required to produce 50% lethality rose at the shorter durations. Combining the results of this study with those from previous shock-tube investigations made it possible to define the tolerance of four small-animal species to sharply rising overpressures as a function of pulse duration. (Author)

AD-403 540 Div. 16
(TISTB/AW) OTS price $5.60

Naval Radiological Defense Lab., San Francisco, Calif.
BEHAVIORAL AROUSAL AND NEURAL ACTIVATION AS RADIOSENSITIVE REACTIONS,
by E. L. Hunt and D. J. Kimeldorf. 27 Feb 63, 50p.
Task MR005 08 5201
NRDL TR624
Unclassified report

Descriptors: *Radiation effects, Radiological dosage, Rats, X rays, Nervous system, Sleep, Heart, Dose rate, Behavior.

In a study designed to detect prompt reactions to ionizing radiation, rats were exposed to 250 kvp X rays, and measurements of behavioral departures from sleep and of heart rate were used to indicate activation of the central nervous system. Exposure at a low dose rate (0.25 r/sec) produced a transitory arousal from sleep within the first 12 seconds (accrued dose of 3 r). At a higher dose rate (1.9 r/sec) this initial reaction increased in scope and, by 30 seconds, included also an acceleration in heart rate. Only animals exposed at the higher dose rate exhibited evidence of excitation during the residual period of exposure to a 1,000 r total dose. Accordingly, the intensity of the reaction during exposure depended upon the dose rate rather than the total dose. A transient excitatory effect at the termination of exposure was indicated by the occurrence of behavioral wakefulness for a period of minutes following exposure at both dose rates. The excitatory effects of irradiation were not dependent upon adrenal function since adrenalectomized animals showed a sequence of reactions comparable to that shown by normal animals but with longer latencies. Some possible modes for the action of ionizing radiation as a stimulus to the nervous system are discussed. (Author)

AD-403 646 Div. 16
(TISTM/WA) OTS price $1.60

Naval Radiological Defense Lab., San Franciso, Calif.
THE EFFECT OF AGE AT EXPOSURE UPON THE RADIATION INDUCED DENTAL DEFECT IN RATS,
by D. C. Jones, T. J. Castanera, and D. J. Kimeldorf. 21 Mar 63, 18p.
NRDL TR634
Unclassified report

Descriptors: *Radiation injuries, *Teeth, Aging (Physiology), Tissues, Pathology, Fast neutrons, Rats.

The effect of age at irradiation upon the severity and temporal distribution of the radiation-induced dental lesion was investigated. Male rats were irradiated with a high sublethal dose (215 rads) of fast neutrons at 31, 110, or 619 days of age. The typical lesion (a chalky zone extending the full width of the tooth) was observed in the exposed shafts of the incisors beginning in the second month post-irradiation. While all animals exhibited the lesion in all incisors, the character of the lesion and its time sequence varied markedly with age at irradiation. The severity of the radiation effect was greater in the youngest group, as indicated by a wider lesion and a greater incidence of animals with fractured incisors (68% vs 11 or 12% for the older groups). The time sequence of appearance, duration of visibility, and disappearance by attrition at the occlusal edge occurred earlier in younger

animals. However, these temporal differences appear related primarily to anatomic and physiologic factors associated with age per se rather than to a differential intensity of radiation damage. (Author)

AD-403 650 Div. 16
(TISTM/CCH) OTS price $1.10

School of Aerospace Medicine, Brooks Air Force Base, Tex.
SURFACE CONTOUR CHANGES AFTER TOOTH EXTRACTION,
by Lucian Szmyd and Warren R. Hester. Mar 63, 7p.
Task 775602
SAM TDR63 16
Unclassified report

Descriptors: *Dentistry, *Mouth, Surface area, Instrumentation, Measurement.

The SAM Contourator, model B, was used to evaluate dimensional changes of the residual ridge mucosa following the extraction of the maxillary second molar on two subjects. An electronic curve-following device was employed to measure the changes in mucosal topography. The combined contourator - curve-follower error was determined and found to be area dependent. The mesial migration of the maxillary third molar after the extraction of the adjacent maxillary molar had little effect on contour changes in the vertical plane. In the horizontal plane, however, movement of the adjacent molar into the extraction site reduced the loss in residual ridge topography. (Author)

AD-403 651 Div. 16
(TISTM/PCR) OTS price $1.10

School of Aerospace Medicine, Brooks Air Force Base, Tex.
STRESS IN DENTAL PATIENTS: ADRENOCORTICAL RESPONSES IN PATIENTS SCHEDULED FOR OPERATIVE DENTISTRY AND FOR IMPACTION SURGERY,
by Ira L. Shannon, Walter V. Davis, Lucian Szmyd, and John R. Prigmore. Feb 63, 4p.
Task 775602
SAM TDR63 11
Unclassified report

Descriptors: *Dentistry, *Corticosteroid agents, Hematology, Adrenal cortex, Stress (Physiology).

Serum free 17-hydroxycorticosteroid levels were determined for 1,700 systemically healthy, young adult males divided into the following groups: One thousand subjects were included in a physiologic baseline study; one control group of 209 subjects was sampled over a 21-week period; a second control group of 248 participants was studied along with 97 patients scheduled for operative dentistry and 146 patients appointed for impaction surgery. All samples were collected between 7:30 and 8:00 a.m. In the baseline study a serum free 17-OHCS mean of 14.82 (S.D. = 3.91) micrograms/100 ml. was found. The means for the two control groups were not significantly different. Variances for these groups did differ ($P < .05$). The anticipation of 'having a tooth filled' was a significant ($P < .05$) stimulus to the adrenal cortex but an appointment for impaction surgery produced a significantly greater response ($P < .001$). (Author)

AD-403 754 Div. 16
(TISTM/WA) OTS price $4.60

Radiation Biology Lab., College Station, Tex.
CHRONIC WHOLE-BODY GAMMA RADIATION STRESS IN THE ALBINO RAT AND MOUSE.
Annual progress rept. Mar 62-Mar 63,
by Sidney O. Brown. Apr 63, 1v. E23 63
Contract DA49 007md957, Proj. 188
Unclassified report

Descriptors: *Whole body radiation, *Radiation tolerance, *Gamma rays, *Hematology, Radioprotective agents, Temperature, Stress (Physiology), Body fluids, Reproductive system, Survival, Audiometry, Reaction (Psychology), Pathology, Rats, Radiological dosage.

Irradiation and the hematology studies are reported on the comparison of the effects of 20, 40 and 50 r per day in the albino rat. Investigations are also reported on: (1) the effect of continuous and discontinuous low-intensity gamma radiation in resistance to cold stress in the albino rat, (2) effect of continuous and fractionated low-intensity gamma radiation on survival of rats given a single dose of high-intensity radiation, and (3) progressive changes in the semen of albino rats subjected to radiation - a technique for the evaluation of radiation damage. Further studies are appended on: (1) effects of continuous low-intensity radiation on the cotton rat, (2) an investigation of audiogenic seizure prone rats as indicators of low-intensity chronic gamma radiation, and (3) investigation on the protective action of B-Aminoethylthiosulfuric acid on rats given repeated macrofractionated doses of gamma irradiation. (Author)

AD-403 760 Div. 16, 15
(TISTM/LMH) OTS price $1.60

Mathematics Research Center, U. of Wisconsin, Madison.
A STOCHASTIC MODEL FOR THE INTERPRETATION OF CLINICAL TRIALS,
by George H. Weiss and Marvin Zelen. Mar 63, 14p. MRC TSR385
Contract DA11 022ORD2059
Unclassified report

Descriptors: *Medical research, *Model tests, Leukemia, Mathematical analysis, Statistical data, Drugs, Therapy, Gamma rays, Statistical processes.

Some diseases can be characterized by the patient being in one of a finite number of states; e.g. relapse, remissive, toxic, etc. These states may be both transient and absorbing. Other authors have proposed similar models to describe data dealing with time dependent phenomena which have assumed that the distribution spent within any state is exponential. These models are all Markovian. In this paper we develop non-Markovian models which allow arbitrary distributions within a state. The model is applied to clinical trials of patients with acute leukemia who are undergoing experimental therapy. The agreement of the model and the data is very good. (Author)

AD-403 812 Div. 16, 28
(TISTB/AW) OTS price $3.60

Aerospace Information Div., Washington, D. C.
SOVIET BIOASTRONAUTICS. SELECTED ABSTRACTS.
16 Apr 63, 33p.
AID P63-48 Unclassified report

Descriptors: *Astronautics, *Space medicine, Physiology, Weightlessness, Plants (Botany), Space environmental conditions, Closed-cycle ecological systems, Astronauts, Biology, Abstracts.

Division 16 - MEDICAL SCIENCES

AD-403 868 Div. 16
(TISTB/WA) OTS price $1.60

Mount Sinai Hospital, New York.
HISTOPATHOLOGY OF GERMFREE ANIMALS.
Annual rept. 1 May 62-30 Apr 63,
Hans Popper, Heinz Bauer, Richard E. Horowitz, and Fiorenzo Paronetto. 30 Apr 63, 15p.
Grant DA MD49 193 61G24
Unclassified report

Descriptors: *Reticuloendothelial system, *Germfree animals, *Histology, Gastrointestinal system, Autoradiography, Adrenocorticotropic hormone, Transplantation, Cytochemistry, Antigen-antibody reaction, X rays, Globulin, Lymphatic system.

The lymphatic tissue of animals reared in the total absence of a microbial flora was deficient in immunologically competent cells and in humoral factors such as antibody and gamma globulin. These animals showed morphologic and humoral responses which were qualitatively indistinguishable from those of experienced conventional animals. The uptake of bacterial antigen and the antibody response to such antigen was essentially the same in germfree and conventional animals. The response of the lymphatic system to toxic liver injury appeared to be similar in germfree and conventional animals. The local response to trauma, although quantitatively different, was qualitatively the same in germfree and conventional animals, and the response of the lymphatic tissue to irradiation was identical in germfree and conventional animals. (Author)

AD-403 891 Div. 16
(TISTM/CCH) OTS price $1.10

New York U. Coll. of Medicine, N. Y.
ETIOLOGY OF EXPERIMENTAL SHOCK.
Progress rept., 1 May 62-30 Apr 63,
by B. W. Zweifach, M. Wurzel, and A. Janoff.
10 May 63, 5p.
Contract DA49 007md993 Unclassified report

Descriptors: *Shock (Pathology), *Vasoactive agents, *Enzymes, Tissue (Biology), Edema, Man, Laboratory animals, Etiology, Peptides, Biochemistry.

Research on lysosomes in normal and tolerant animals subjected to shock was continued to test the hypothesis that the release by cells of the hydrolases contained in cytoplasmic lysosome granules into the circulation may exacerbate tissue injury and contribute to the irreversible trend during shock. Adaptation or tolerance is associated with a greater stability of lysosome particles even under in vitro conditions. Mitochondrial systems were not similarly stabilized. Agents which predispose to shock (Thorotrast) or which nullify tolerance appear to do so by a direct action of this colloid on the lysosomal membranes of Kupffer cells and other macrophages. The local release of lysosomal enzymes appears also to contribute to the genesis of local tissue injury, since depletion procedures (excess vitamin A) inhibit local inflammatory reactions as well as the local hemorrhagic necrosis induced by combinations of bacterial endotoxins and epinephrine. A new polypeptide, (SVPx, - serum vasoactive peptide unknown), was purified and concentrated from the blood plasma and serum of rabbits and man. In high concentrations the polypeptide is as effective a contracting agent as norepinephrine. In low concentrations the material strongly potentiates the action of constrictors such as norepinephrine. (Author)

AD-403 893 Div. 16
(TISTM/CCH) OTS price $1.10

School of Aerospace Medicine, Brooks Air Force Base, Tex.
METABOLISM OF NOREPINEPHRINE IN RAT TISSUE HOMOGENATES,
by Joseph L. Borowitz and James H. Merritt.
Dec 62, 5p.
Task 775202
SAM TDR62 138
Unclassified report

Descriptors: *Epinephrine, *Brain, *Isoniazid, *Organic compounds, Heart, Rats, Dosage, Magnesium, Metabolism, Tissue culture, Pathology, Biochemistry.

In this study, tissue homogenates served as convenient systems in which to investigate the metabolism of norepinephrine. Iproniazid was found to delay the disappearance of norepinephrine from rat brain homogenate. The effect became significant after 4 hours of incubation. High concentrations of magnesium (1.2 x 10 to the -2 M) counteracted this effect of iproniazid. Large doses of magnesium, however, did not affect the increased brain norepinephrine level produced by iproniazid in rats. Oxalate, 3.2 x 10 to the -2 M, did not inhibit the decay of norepinephrine in rat brain homogenates, but in one experiment it enhanced the effect of iproniazid in this system. In a limited number of experiments, both iproniazid and oxalate delayed the disappearance of norepinephrine from rat heart homogenate. (Author)

AD-403 894 Div. 16, 28
(TISTB/AW) OTS price $1.10

School of Aerospace Medicine, Brooks Air Force Base, Tex.
A NEW CHRONICALLY IMPLANTED ELECTRODE FOR RECORDING NYSTAGMUS IN ANIMAL,
by Patrick J. Dowd, George L. Anstadt, and Ewald Koegel. Nov 62, 7p.
Task 775203
SAM TDR62 125
Unclassified report

Descriptors: *Ear, *Eye, Surgery, Surgical supplies, Cats, Motion, Electrodes, Gold, Electroencephalography, Stimulation, Recording systems.

An electrode was developed to provide a more accurate and adequate method of recording eye position and movement. The electrode is simple to make and apply, and it will remain in the desired sites for some length of time with minimal changes in itself or in the surrounding tissue. This type of electrode can easily be used in other studies, such as EEG investigations in animals. (Author)

AD-403 900 Div. 16
(TISTB/AW) OTS price $1.10

School of Aerospace Medicine, Brooks Air Force Base, Tex.
THE RESPONSE OF THE OTOLITH ORGANS TO TILT,
by Morgan E. Wing. Nov 62, 7p.
SAM TDR62-132 Unclassified report

Descriptors: *Ear, *Otorhinolaryngology, Cats, Sensory mechanisms, Posture, Ganglia, Space medicine, Nerves.

Action potentials and their changes in response to tilt were recorded from 60 units in the vestibular ganglion, presumably supplying the otolith organs of 10 cats. The action potentials in all units were infrequent and irregular after

position was maintained for some time. The majority of the units showed no response to any change in position. In most cases, of those which exhibited a response, the responses were delayed an average of 40 seconds. The evidence presented supports the view that the utricle and saccule may be vestigial organs, or at least do not function meaningfully in the orientation of the cat with respect to the gravitational field. (Author)

AD-404 011 Div. 16, 30
(TISTM/PCR) OTS price $1.10

Naval Radiological Defense Lab., San Francisco, Calif.
CONSTRUCTION OF A MODIFIED HENDERSON APPARATUS,
by J. F. Pribnow and M. S. Silverman. 14 Mar 63, 10p.
NRDL TR629 Unclassified report

Descriptors: *Aerosols, *Test equipment, Microorganisms, Construction, Mice.

An apparatus for exposing mice to an aerosol of microorganisms was developed. It is a modification of the Henderson apparatus, adapted for exposure of smaller animals. The design allows for placement of the complete apparatus in a bacteriological hood. Although of relatively simple design and operation, it has proven highly dependable. (Author)

AD-404 014 Div. 16
(TISTM/PCR) OTS price $2.60

United States Air Forces in Europe, (Wiesbaden, Germany).
SERVICES PROVIDED BY THE USAFE EPIDEMIOLOGICAL FLIGHT,
by George R. Anderson, Wesley R. Nowell, Donald R. Bridgewater, William J. Robertson, Emerick W. Toth. 1963, 19p.
USAFE 63 1
Unclassified report

Descriptors: *Epidemiology, Medical laboratories, Food, Food poisioning, Analysis, Tests, Bacteria, Animals, Man, Diseases, Parasites, Hemosporidia, Bacillus anthracis, Trypanosoma, Water, Culicidae, Muscidae, Gastropoda, Reptiles, Containers, Military medicine.

The epidemiological services available to USAFE medical facilities are identified and discussed. The scope and mode of operation is presented. Further, the laboratory capabilities are discussed with detailed instruction on the collection and shipping of speciments. (Author)

AD-404 015 Div. 16
(TISTB/AW) OTS pirce $1.10

United States Air Forces in Europe (Turkey).
1962 ZOONOTIC DISEASE INCIDENCE FOR TURKEY,
by Jack E. Kielty, Joseph C. Nothern and ed. by Donald R. Bridgewater. 1963, 7p.
USAFE 63 3
Unclassified report

Descriptors: *Epidemiology, Diseases, Bacillus anthracis, Brucella, Actinobacillus, Trichinella, Neurotropic viruses, Skin and mucous membrane viruses, Maps.

An over-all picture is given of the incidence of six of the zoonotic diseases as reported in Turkey. All information was extracted from 'The Bulletin of the Reportable Contagious Diseases,' published in Ankara. This information was collected covering the period 1 January 1962 through 31 December 1962, with particular reference to epidemic areas and consequential spread to the surrounding provinces. (Author)

AD-404 057 Div. 16
(TISTM/PCR) OTS price $2.60

United States Air Forces in Europe (Turkey).
EVALUATION OF ENTEROCOCCI AND COLIFORM ORGANISMS AS WATER POLLUTION INDICATORS,
by William J. Robertson. 1963, 17p.
USAFE Unclassified report

Descriptors: *Water supplies, *Enterobacteriaceae, *Streptococcus, Epidemiology, Tests, Sewage, Contamination.

The utilization of enterococci and coliform organisms as water pollution indicators was studied using the Izmir, Turkey, water supply system and other local sources. The individual merits of each organism are discussed in detail with particular application to the Izmir findings. Recommendations are included insofar as current literature research and field application will allow. (Author)

AD-404 218 Div. 16
(TISTM/AAR) OTS price $13.00

USAF Radiation Lab., U. of Chicago, Ill.
(No title).
Quarterly progress rept. no. 47,
by Kenneth P. DuBois. 15 Apr 63, 180p.
Contract AF41 609 1693, Proj. 5830
Unclassified report

Descriptors: *Radiation effects, *Liver, *Radioprotective agents, *Enzymes, Biochemistry, X rays, Drugs, Rats, Pharmacology, Therapy, Cyanide, Protons, Mice, Rare earth compounds, Mammals, Tissues, Toxicity.

Reports discribing the effects of ionizing radiations on the biochemistry of mammalian tissues, pharmacological and toxicological compounds as protective or therapeutic agents against radiation injury in experimental animals, and the influence of exposure to low levels of gamma or fast neutron irradiation on the life span of animals are presented.

AD-404 256 Div. 16
(TISTM/CCH) OTS price $1.10

Biomedical Lab., Aerospace Medical Div., Wright-Patterson Air Force Base, Ohio.
CURRENT RESEARCH FOR SPACE TRAVEL. NUTRITION AND FOOD TECHNOLOGY.
Apr 63, 7p.
AMRL M M33
Unclassified report

Descriptors: *Food, *Nutrition, *Food dispensing, Containers, Radiobiology, Closed ecological systems, Space flight, Space medicine.

AD-404 263 Div. 16, 12, 32
(TISTM/TCG) OTS price $1.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
THE USE OF ETHYLENE OXIDE FOR STERILIZATION: A PARTIALLY ANNOTATED BIBLIOGRAPHY,
comp. by Charlie M. Pierce. Sep 62, 12p.
5 10 62 26; SB62 35
Unclassified report

Descriptors: *Spacecraft, *Microorganisms,

*Germicides, *Organic compounds, Chemical reactions, Test methods, Decontamination, Bibliographies, Pharmacology.

Ethylene oxide has proven to be one of the better agents for the sterilization of spacecraft. The scope of this search involves the chemical reactions involved in the destruction of microorganisms and their spores. The 39 references which were selected are alphabetically arranged according to the first author. The resources of the LMSC Technical Information Center were utilized in this search. The period of coverage dates from 1950 to June 1962. (Author)

AD-404 295 Div. 16, 4
(TISTM/CCH) OTS price $1.60

Polytechnic Inst. of Brooklyn, N. Y.
MECHANISM OF ENZYME ACTION.
Terminal rept., 1 Sep 61-30 Sep 62,
by C. G. Overberger, Thomas St. Pierre, Norman Vorchheimer, and Samuel Yaroslavsky. 28 Dec 62, 14p.
Grant DA CML18 108 61G25
Unclassified report

Descriptors: *Enzymes, *Organic compounds, Chymotrypsin, Degradation, Biochemistry.

The purpose of the study of polymeric models for enzymatic activity is to discern the geometric contributions from electrostatic and other factors which may have an equally important role. Comparative determination of rate profiles coupled with dissociation data and related measurements provide an analytical tool for the understanding of the intricacies of the mechanism of polymeric catalysts. The information obtained may be utilized for the improvement of the model systems in comparison with the natural catalysts. (Author)

AD-404 297 Div. 16
(TISTM/LMH) OTS price $.50

Washington U., St. Louis, Mo. School of Medicine.
CUMULATIVE AUDITORY EFFECTS RESULTING FROM MULTIPLE EXPOSURE TO INTENSE ACOUSTIC STIMULATION. PART II. HISTOLOGICAL EFFECTS OF INTENSE SOUND ON THE INNER EAR,
by W. P. Covell. Jan 63, 12p.
Contract AF33 616 3637, Proj. 7231, Task 71786
AMRL TDR62 99, v. 2 Unclassified report

Report on Acoustic Energy Control.

Descriptors: *Noise, *Ear, Wounds and injuries, Hearing, Thresholds (Physiology), Histology, Tissues (Biology), Auditory nerve.

Thirty-three cats were subjected to sound exposures, and auditory threshold shift measurements are reported in Part I. The animals were subsequently sacrificed and their inner ears prepared for microscopic examination for evidence of tissue injury. The histological findings of injuries are reported. Wide band noise at 115 db for one-half hour produced mild injuries; for 2-hour exposures the injuries were moderate to severe; for 8-hour exposures there were severe injuries. Post-exposure lives of these animals were 80 to 90 days. Animals sacrificed 2 to 4 hours after exposure showed essentially the same degree of injury with the same 2-hour exposure as above. Two hours total exposure at 115 db divided into 16 doses of 7.5 minutes each, with one hour inter-exposure intervals resulted in slight to moderate changes. The same total energy in the same number of doses for 7.5 minutes, with an inter-exposure interval of 6 hours, produced comparatively slight injuries. (Author)

AD-404 530 Div. 16
(TISTM/LMH) OTS price $2.60

Louisville U., Ky.
THE LOAD-ENDURANCE RELATIONSHIP FOR A STATIC MANUAL RESPONSE,
by Lee S. Caldwell. Mar 63, 27p. TR2
Contract DA49 193md2197
Unclassified report

Descriptors: *Stress (Physiology), Fatigue (Physiology), Body weight, Adaptation (Physiology), Statistical analysis, Weight.

Each of 64 male subjects was required to maintain certain proportions of his maximum response strength as long as possible. An essentially linear relationship was obtained between the relative load (the percentage-of-maximum strength) and the endurance of the manual response within the range of loads employed. As the load was increased from 50% to 80% of maximum strength, the mean endurance of manual pull decreased from 63.3 sec to 21.4 sec. A comparison of endurance scores for two arm positions yielding different response strengths revealed little difference in performance despite the fact that the mean force to be maintained was 41% greater at one arm position than at the other. Relative loading tended to equalize endurance despite large differences in the actual force of the sustained response. (Author)

AD-404 553 Div. 16
(TISTM/PCR) OTS price $1.10

Army Biological Labs., Frederick, Md.
THE ROLE OF WATER IN THE ETIOLOGY OF ANIMAL BOTULISM METHOD OF DETECTION OF BOTULISMUS TOXIN C IN WATER,
by L. Pigoury, C. Michel, and C. Chabassol. Mar 63, 2p.
ABL T 751 Unclassified report

Descriptors: *Clostridium botulinium, *Diseases, *Toxins and antitoxins, Food poisoning, Animals, Etiology, Water, Veterinary medicine, Spores, Freeze drying, Injection (Medicine), Mice, Detection.

17. METALLURGY

AD-403 508 Div. 17, 25, 30
(TISTA/LSK) OTS price $4.60

Ohio State U. Research Foundation, Columbus.
ASPECTS OF RELIABILITY UNDER CONDITIONS OF ELEVATED TEMPERATURE CREEP AND FATIGUE.
Summary rept. 1 Feb-1 Oct 62,
by A. M. Freudenthal. Mar 63, 39p.
Contract AF33 616 6288, Proj. 7351, Task 735106
ASD TDR63 267
Unclassified report

Report on Metallic Materials.

Descriptors: *Airframes, Guided missiles, Structures, Reliability, Aviation safety, Safety, Mathematical prediction, Equations, Dynamics, Loading (Mechanics), Aerodynamic loading, Life expectancy, Aeroelasticity, Aerothermoelasticity, Creep, Fatigue (Mechanics), Supersonic flight, Supersonic planes.

The solution of the problem of attaining adequate safety and reliability in supersonic aircraft structures operating under conditions under which

the damaging effects of cycle sensitivity (fatigue) and time-sensitivity (creep) of the structural material combine in gradually reducing the resistance of the structure requires the development of simplified procedures for the evaluation of the combined damage accumulation, which embody both the physical and probabilistic aspects of design. The present report attempts to develop the basis for an approach to the solution of this problem, for which no adequate experimental information exists at present. One of its purposes is to provide the guidelines for the planning of tests and experiments, the results of which would be relevant for structural design. (Author)

AD-403 526 Div. 17
(TISTM/BRW) OTS price $4.60

Hammond Metallurgical Lab., Yale U., New Haven, Conn.
X-RAY DIFFRACTION STUDY OF DEFORMATION BY FILING IN BCC REFRACTORY METALS,
by E. N. Aqua and C. N. J. Wagner. Mar 63, 1v.
TR4
Contract Nonr60943

Unclassified report

Descriptors: *Heat resistant metals and alloys, Chromium, Niobium, Tantalum, Tungsten, Vanadium, X-ray diffraction analysis, Cold working, Anisotropy, Grain structure (Metallurgy), Crystal lattice defects, Microstructure, Particles, Heat treatment, Elasticity, Fourier analysis, Molybdenum, Iron, Deformation.

The BCC refractory metals, niobium, tantalum, vanadium, chromium and tungsten were cold worked by filing at room temperature. The broadening of the powder pattern peaks was studied by Fourier analyses of the line shapes. The effective particle sizes, De(hkl), and root mean squared (rms) strains were measured in different crystallographic directions. Anisotropic values of particle sizes observed in tantalum and niobium were an indication of faulting in these metals. The degree of anisotropy of particle sizes was much smaller in vanadium; tungsten and chromium showed isotropic particle sizes. The ratio of rms strains may be calculated from the directional variation of Young's modulus. The absolute magnitude of rms strains was also computed for isotropic BCC metals without faulting. The amount of faulting is observed to increase with the degree of elastic anisotropy of the BCC metals of the group Vb. Metals of group VIb show no x-ray diffraction evidence of faulting. (Author)

AD-403 681 Div. 17, 26
(TISTM/PCR) OTS price $13.00

Hamilton Standard Div., United Aircraft Corp., Windsor Locks, Conn.
ELECTRON BEAM WELDING OF AEROSPACE MATERIALS,
by William I. Kern and Lawrence E. Lubin. Feb 63, 178p.
Contract AF33 657 7763, Proj. 7351, Task 735102
ASD TDR63 132

Unclassified report

Descriptors: *Electron beams, *Welding, Welds, Metallurgy, Thermodynamics, Materials, Machining, Heat treatment, Beryllium, Beryllium alloys, Molybdenum alloys, Titanium alloys, Tungsten, Fracture (Mechanics), Ductility, Steel, Aging (Materials), Radiography, Grain structures (Metallurgy), Porosity, Tensile properties, Metallography, Tables, Microphotography.

High-voltage electron beam welding techniques capable of producing butt welds of optimum strength and ductility were developed for B120VCA titanium, D6AC steel, molybdenum-0.5% titanium to tungsten, and beryllium. Welds were produced in material thicknesses of 0.125 inch for the B120VCA titanium; 0.290 inch and 0.090 inch for the D6AC steel; 0.100 inch, 0.050 inch, and 0.005 inch for the molybdenum-0.5% titanium welded to tungsten; and 0.040 inch for the beryllium. The effects of thermal treatments (aging and heat treating) were investigated in the B120VCA and D6AC by welding and testing a variety of weld/thermal treatment combinations. A comprehensive preliminary welding phase was conducted during which the effects of various welding conditions on weld-zone characteristics were evaluated by visual, radiographic or dye penetrant, and metallographic inspection. Welds were evaluated for extent of fusion, grain size, cracking, porosity, and other pertinent effects. (Author)

AD-403 702 Div. 17, 25, 9, 12, 22
(TISTA/LSK) OTS price $2.50

Southwest Research Inst., San Antonio, Tex.
RESPONSE OF MISSILE STRUCTURES TO IMPULSE LOADING.
Final rept. 1 Mar 61-31 Mar 62,
by T. Wah, L. U. Rastrelli, N. L. Basdekas and R. C. DeHart. Mar 63, 102p.
Contract AF33 616 7956, Proj. 6906, Task 690601
ASD TDR62 475

Unclassified report

Report on Nuclear Weapon Effects on Space Vehicles.

Descriptors: *Structural shells, *Cylindrical bodies, *Airframes, Shock waves, Nuclear explosions, Guided missiles (Surface-to-surface), Impact shock, Spacecraft, Flat plate models, Mathematical prediction, Aeroelasticity, Loading (Mechanics), Antimissile defense systems, Dynamics, Blast.

Procedures for analytically predicting the response of missile bodies to blast loadings are presented. The investigation involves the behavior of cylindrical shells (with various endclosures) and circular, flat plates. The numerical results obtained from the analytical methods compare favorably with the experimental data acquired during the study. (Author)

AD-403 757 Div. 17
(TISTM/AM) OTS price $1.60

Laboratories for Research and Development, Franklin Inst., Philadelphia, Pa.
PREPARATION AND EVALUATION OF HIGH PURITY BERYLLIUM.
Quarterly progress rept. 2 Oct 62-1 Jan 63,
by G. E. Spangler, M. Herman, E. J. Arndt, D. B. Hoover and V. V. Damiano. 1 Jan 63, 15p.
Q B1933 5
Contract NOw62 0536

Unclassified report

Descriptors: *Beryllium, *Single crystals, *Zone melting, Beryllium alloys, Copper alloys, Electron microscopy, Diffusion, Stresses, Isotopes, Deformation, Metallography, Mechanical properties, Fracture (Mechanics).

The purpose of this investigation is to produce high purity beryllium and to study its deformation and fracture characteristics. The zone melting of one one-inch-diameter bar was completed. A single crystal specimen of a copper-

beryllium alloy containing 5 weight per cent copper was tested in tension with the crystal oriented for basal glide. This specimen exhibited a CRSS on the basal plane of 7800 PSI and underwent a 19% reduction in area, equivalent to 23% elongation, over about one half the gage length of the specimen prior to fracture. (Author)

AD-403 775 Div. 17, 14
(TISTM/BRW) OTS price $5.60

Defense Metals Information Center, Columbus, Ohio.
DEFENSE METALS INFORMATION CENTER SELECTED ACCESSIONS,
Comp. by Patricia B. Plate. 45p.
Unclassified report

Descriptors: *Metals, *Bibliographies, Alloys, Cobalt alloys, Iron alloys, Nickel alloys, Stainless steel, Steel, Beryllium, Magnesium, Titanium alloys, Ceramic materials, Metallic textiles, Cutting tools, Magnetic alloys, Fracture (Mechanics), Explosive forming, Coatings, Graphite, Refractory materials, Niobium alloys, Molybdenum alloys, Tantalum alloys, Vanadium alloys, Composite materials, Non-destructive testing, Glass textiles, Heat resistant metals and alloys, Textiles.

Contents: Author index: Subject index: High-strength alloys: Cobalt base; Nickel base; Engineering steels; Stainless steels; and Iron base. Light metals: Beryllium; Titanium; and Magnesium. Nonmetallics: Carbon, graphite; Special refractories; and Ceramic oxide. Refractory metals: Columbium; Chromium; Molybdenum; Tantalum; Vanadium; Tungsten; and Platinum group. Miscellaneous: Coatings; Applications; and Composites.

AD-403 776 Div. 17
(TISTM/PCR) OTS price $7.60

Case Inst. of Tech., Cleveland, Ohio.
AN INVESTIGATION OF TRANSFORMATION CHARACTERISTICS OF THREE URANIUM BASE ALLOYS.
Final rept.,
by P. E. Repas, R. H. Goodenow and R. F. Hehemann. Jan 63, 43p. TR AMRA CR63 02/1F
Contract DA33 019ORD3630, Proj. 5N12 15 030
Unclassified report

Descriptors: *Uranium alloys, Phase studies, Metallography, Intermetallic compounds, Dynamics, Molybdenum alloys, Titanium alloys, Niobium alloys, Zirconium alloys, Hardness, X-ray diffraction analysis, Heat treatment, Microphotography, Transformations.

The investigation was directed toward two main objectives: (1) to develop Time-Temperature-Transformation (TTT) diagrams for several uranium base alloys, and (2) to develop metallographic techniques suitable for the identification of phases, intermetallic compounds and nonmetallic constituents in these and several other alloys. Accordingly, the report is presented in two parts dealing separately with each of these topics. TTT diagrams are presented and transformation kinetics are described for five alloys: (1) U-10%Mo, (2) U-8%Mo, (3) U-8%Mo-1/2%Ti, (4) U-8%Mo-1%Ti, and (5) U-2%Mo-2%Nb-2%Zr-1/2%Ti. Metallographic, dilatometric, hardness and x-ray techniques were utilized in establishing the TTT diagrams. Sensitivity and limitations of each technique are discussed. Metallographic techniques were perfected for the uranium base alloys for nearly all conditions of heat treatment. Certain low temperature transformation structures and the identification of nonmetallic inclusions were not completely resolved. Metallographic structures of the specimens submitted by U. S. Army Materials Research Agency are interpreted where possible in terms of the established TTT diagrams. (Author)

AD-403 779 Div. 17, 25
(TISTM/AMS) OTS price $1.10

Keck, W. M. Lab of Engineering Materials, Calif. Inst. of Tech., Pasadena.
METASTABLE CLOSE-PACKED STRUCTURES IN SILVER-RICH BINARY ALLOYS WITH TIN, ANTIMONY AND SILICON,
by W. Klement, Jr. Apr 63, 6p. TR14
Contract Nonr220 30
Unclassified report

Descriptors: *Silver alloys, *Phase studies, Crystal lattices, Crystal structure, Tin alloys, Antimony alloys, Silicon alloys.

AD-403 796 Div. 17, 26
(TISTM/AM) OTS price $4.60

Central Inst. for Industrial Research (Norway).
DEVELOPMENT OF EXPLOSIVE TECHNIQUES IN METAL FORMING.
Status rept. no. 1, 1 July-31 Dec 62,
by B. Haagland, K. Bordalen, B. Eftestol, T. Lindtveit, and K. Schreiner. 31 Jan 62, 43p.
Contract N15MWP N62
Unclassified report

Descriptors: *Industrial equipment, *Explosive forming, *Bibliographies, Stainless steel, Deformation, Austenite, Martensite, Low temperature research, Cryogenics, Processing, Production, High-temperature research, Welding, Titanium, Powder metals, Tungsten, Metals.

The building of experimental facilities was finished and preliminary experiments conducted. Explosive charges up to 1 kg, can be detonated in 3 m-wide tank. A bibliography containing about 1500 references was organized and important technical reports were purchased. Detailed planning of experiments and necessary equipment was the main activity in the reported period. The program comprises the following main subjects: Die construction, dynamic formability, structural changes, forming at elevated temperatures, welding and compaction of powder. (Author)

AD-403 810 Div. 17
(TISTM/BRW) OTS price $3.00

General Telephone and Electronics Labs. Inc. Bayside, N. Y.
OXIDATION RESISTANT COATINGS FOR TANTALUM ALLOYS AND OTHER METALS.
Final rept. 1 Nov 61-30 Nov 62,
by L. Sama. Feb 63, 141p. TR62 4607
Contract AF33 657 7339, Proj. 7312, Task 731201
ASD TDR63 160 Unclassified report

Descriptors: *Tantalum alloys, Tantalum, Niobium, Tungsten, Molybdenum, Tungsten alloys, Niobium alloys, Vanadium alloys, Zirconium alloys, Oxidation, Diffusion, Mechanical properties, X-ray diffraction analysis, Silicides, Beryllium compounds, Rupture, Stresses, Metal coatings, Aluminum alloys, Tin alloys, Coatings.

The effect of coating composition on structural changes and oxidation behavior was studied using a Sn-Al spray-slurry system with tantalum, tantalum alloys, columbium, tungsten and molybdenum. In tests conducted at 3000 F, it was found that

increased oxidation protection was significantly related to the thickness of the tin-rich phase at the surface. Refractory metal powder additives plus excess aluminum to form aluminide particles served best to increase the thickness of this phase. Coating composition was optimized, and an extensive evaluation was carried out with Ta-10%W, Ta-30%Cb-7.5%V, and Cb-5%Zr. In oxidation tests at 1100 F to over 3000 F protective life was significantly affected by substrate composition, coating thickness and thermal cycling. Tensile and stress rupture data were obtained on coated samples at 2000 to 3000 F and correlated fairly well with data in the literature for uncoated material. Preliminary studies were made of coating stability at air pressures in the micron to millimeter range. Oxidation and diffusion effects were explored by metallographic electron probe and x-ray analysis. A brief study of Ta-10Hf-5W in contact with Al2O3 at elevated temperatures showed that this alloy was unstable in contrast to pure tantalum, Ta-10W, and Ta-30Cb-7.5V, which were quite stable. (Author)

AD-403 892 Div. 17, 25
(TISTM/PCR) OTS price $1.75

Franklin Inst., Philadelphia, Pa.
INVESTIGATION OF THE STRUCTURAL AND MAGNETIC PROPERTIES OF THIN FERROMAGNETIC FILMS.
Rept.0for 1 May 59-31 July 62,
by A. Baltz and William Doyle. Mar 63, 65p.
Contract AF33 616 8940, Proj. 7371, Task 737103
WADD TR60 787, V2 Unclassified report

Report on Applied Research in Electrical, Electronic and Magnetic Materials.

Descriptors: *Ferromagnetic materials, *Crystal structure, Magnetic properties, Structural properties, Iron alloys, Nickel alloys, Thin films (Storage devices), Electron microscopy, Anisotropy, Electron diffraction analysis, Evaporation, Epitaxial growth, Vacuum apparatus, Torque, Rotation, Hysteresis, Magnetometers, Thickness, Single crystals, Manufacturing methods, High temperature research, Microphotography, Carbon, Silicon compounds, Monoxides, Platinum alloys, Palladium alloys, Chromium, Tungsten compounds, Oxides, Films.

Permalloy films evaporated at normal and oblique incidence to a substrate were examined by replication of their surfaces. Electron micrographs revealed chains of particles perpendicular to the incident beam when the angle of incidence was less than 70 degrees and parallel to the incident beam when the angle was greater than 70 degrees. The degree of alignment depended upon the angle of incidence and thickness of the film. Permalloy films were epitaxially grown on NaCl and were annealed by electron bombardment in an electron microscope. Perfect single crystal diffraction patterns indicated the presence of (100) parent crystals and (122) twin crystals. Fringe patterns observed on electron micrographs were identified by dark field microscopy and electron diffraction as being caused by platelets of twins 100-400 angstroms thick, lying parallel to (111) planes of the parent crystal. The non-integral reflections were shown to be caused by double diffraction. (Author)

AD-403 927 Div. 17, 4
(TISTM/AMS) OTS price $1.10

Ohio State U., Research Foundation, Columbus.
THE MECHANISM OF OXIDE FORMATION IN THE INITIAL STAGES OF OXIDATION.
Quarterly rept. no. 11, 1 Jan-31 Mar 63,
by D. W. Rausch, K. L. Moazed, and M. G. Fontana.
29 Apr 63, 3p.
Contract DA33 0190RD3387, OOR Proj. 2734
Unclassified report

Descriptors: *Tungsten, *Tantalum, *Oxidation, High temperature research, Oxides, Tantalum compounds, Tungsten compounds, Test methods, Crystals, Crystal structure, Field emission, Low temperature research, Nucleation.

The major experimental efforts during the report period were directed toward the achievement of a more precise definition of the oxide microcrystallites formed on the tungsten and tantalum substrates in the initial stages of the oxidation reaction. The field emission experiments revealed the existence of nuclei of a second phase on the surface by virtue of highly localized and sharply defined discontinuities in electron emission intensity. While the nuclei appear more or less simultaneously at regularly spaced intervals on the surface and their number remains approximately constant for specific crystallographic regions of the tungsten substrate, simultaneous nucleation is not observed in the region of tungsten or on any preferred crystallographic region of the tantalum substrate. The non-simultaneous nucleation is apparently characterized by random location of nuclei (i.e., nucleating centers do not occur at regular intervals over the surface) and in many cases by an increasing field enhancement effect with increasing growth. This effect may be attributed to a relatively greater growth rate perpendicular to the substrate than parallel to it (i.e., whisker-like growth). (Author)

AD-404 087 Div. 17, 25, 26
(TISTM/AMS) OTS price $2.60

Metals Processing Lab. Mass. Inst. of Tech., Cambridge.
THE STRENGTH AND PLASTICITY OF ANISOTROPIC METALS,
by W. A. Backofen and W. F. Hosford, Jr.
31 Dec 62, 18p.
Contract DA19 0200RD5719, Proj. 59332008
WAL TR834 12 2 1
Unclassified report

Descriptors: *Anisotropy, *Titanium, *Magnesium alloys, Crystal structure, Tensile properties, Stresses, Shear stresses, Plasticity, Taylor's series, Mathematical analysis, Sheets.

Tension tests were made on strip specimens cut at different angles from textured sheets. For a pure titanium sheet, RC-70 annealed, the angular variation of yield stress and strain ratio do not agree with the predictions of Hill's anisotropic plasticity theory. Relatively low R values observed in magnesium alloy (AZ31B) sheets with strong (0001) yextures are interpreted as resulting from basal slip. For cubic metals, a method is outlined for calculating the relationship of plastic anisotropy to crystallographic texture. The method, which is an extension of Taylor's analysis of plastic strains in polycrystalline metals, is used to predict the flow stress and strain ratio resulting from various textures. (Author)

AD-404 089 Div. 17
(TISTM/BRW) OTS price $2.25

Universal-Cyclops Steel Corp., Bridgeville, Pa.
DEVELOPMENT OF TUNGSTEN SHEET BY THE USE OF

ULTRA-FINE TUNGSTEN METAL POWDER.
Interim technical progress rept. no. 1, 28 Jan-28 Mar 63, on phase 1,
by J. H. Schwertz. Apr 63, 1v.
Contract AF33 657 10513
AMC TR8 107, P1

Unclassified report

Descriptors: *Tungsten, *Powder metals, Sheets, Materials forming, Particles, Sintering, Additives, Impurities, Hydrostatic pressure, Density, Transition temperature, Extrusion, Forging, Rolling mills, Recrystallization, Microstructure, Hydroforming (Mechanical), Powder metallurgy, Manufacturing methods.

A state-of-the-art analysis of the use of ultra-fine tungsten metal powder (.01 to .1 micron range of particle size) in the production of tungsten sheet products was completed. Both the available technology and industry capabilities as related to raw material availability, handling methods, consolidation practices and conversion methods were analyzed. The three major commercial sources of ultra-fine tungsten powder performed limited experimentation in further consolidation of these powders. Government facilities and private research organizations made limited investigation of the powder, consolidation and fabrication characteristics. The state-of-the-art included a discussion of the recrystallization and ductile to brittle transition temperature behavior of sheet produced from conventional tungsten powders; the significance of these findings to this program is noted. (Author)

AD-404 159 Div. 17, 25
(TISTP/JW) OTS price $2.60

Pennsylvania U., Philadelphia.
THEORY OF HIGH-TEMPERATURE MAGNETOSTRICTION,
by Herbert B. Callen and Earl R. Callen. 1963, 23p.

Unclassified report

Descriptors: *Magnetostriction, Iron, Boundary layer, Phonons, Impurities, High temperature research.

AD-404 177 Div. 17, 26, 7
(TISTE/JBM) OTS price $10.10

Westinghouse Electric Corp., Pittsburgh, Pa.
THERMOELECTRICITY.
Quarterly progress rept. no. 4,
by D. R. Thornburg. Dec 62, 1v. RR33 964 242R1
Contract NObs86595

Unclassified report

Descriptors: *Thermoelectricity, *Semiconductors, *Intermetallic compounds, Bonding, Antimony alloys, Bismuth alloys, Cobalt alloys, Germanium alloys, Tellurium alloys, Tin alloys, High pressure research, Sintering, High temperature research, Mechanical properties, Diffusion, Processing, Life expectancy, Oxidation, Density, Induction heating, Tensile properties, Thermocouples, Effectiveness, Compressive properties, Stresses, Fixed contacts, Tin, Manufacturing methods, Powder metallurgy.

Efforts were continued on the investigation of thermoelectric compounds and processing techniques for their fabrication. An experiment on the effect of changing the final sintering temperature of GeBiTe has shown that properties and consistency are improved by determining the solidus for each heat, and then setting the final sintering temperature at or slightly below that temperature. The efficiency of a multiple array of BiSbTe-PbTe couples was found to be 7%. The mechanical and vaporization-oxidation properties of CoSbTeSe were measured to 700 C. Results from investigation of ''p'' type Co-Sb base alloys are presented. The work on Sn diffusion bonding, with and without protective recesses, was completed. (Author)

AD-404 182 Div. 17, 26, 27
(TISTM/PCR) OTS $2.60

Republic Aviation Corp., Mineola, N. Y.
EVALUATION OF HIGH-STRENGTH LIGHTWEIGHT LAMINATED PRESSURE VESSELS OF LAP-JOINT CONSTRUCTION.
Quarterly progress report no. 4, 1 Oct to 31 Dec 62,
by G. Citrin. 16 Jan 63, 20p.
Contract DA30 069ORD3440, Proj. 59332008
WAL TR766 2 3 3 Unclassified report

Descriptors: *Pressure vessels, *Rocket cases, *Bonded joints, Joints, Bonding, Cobalt alloys, Molybdenum alloys, Sheets, Processing, Specifications, Rings, Production, Rupture, Tests, Tensile properties, Steel, Thickness, Brazing, Welding, Hydrostatic pressure, Heat treatment, Metal joints, Aging (Materials), High temperature research, Design, Fracture (Mechanics), Metallurgy, Laminates, Adhesives, Nickel alloys.

The production sheet metal material was evaluated against specification requirements. Rings were fabricated of the 0.021-in. thick mar-aging steel material for the first 3 pressure vessels. The first pressure vessel was assembled and tested successfully producing a burst strength 7.9% greater than that indicated by uniaxial tensile tests of the parent sheet metal. (Author)

AD-404 205 Div. 17
(TISTM/AMS) OTS price $2.60

General Electric Co., Schenectady, N. Y.
EFFECT OF BASIC PHYSICAL PARAMETERS ON ENGINEERING PROPERTIES OF INTERMETALLICS, PART IV.
Summary rept.,
by J. H. Westbrook and D. L. Wood. Apr 63, 21p.
Contract AF33 616 7714, Proj. 7350, Task 735001
WADD TR60 184, pt. 4

Unclassified report

Report on Refractory Inorganic Non-Metallic Materials.

Descriptors: *Intermetallic compounds, Brittleness, Ductility, Stresses, Hardness, Grain structures (Metallurgy), Transition temperature, Silver alloys, Magnesium alloys, Nickel alloys, Aluminum alloys, Mechanical properties.

This report is a continuance of the author's mechanical property measurements and grain boundary studies on AgMg. A general survey of the effects of dilute ternary solute additions on the flow stress of AgMg has been made. A unique, efficient device to measure ductile-brittle transition temperatures on wire specimens has been designed and built. Using this device, the effects of composition, grain size, strain rate, and ternary solute additions on the transition temperature have been documented for AgMg. Further studies of the kinetics of solute-induced grain boundary hardening indicate that the phenomenon is much more complex than previously supposed. (Author)

AD-404 211 Div. 17, 26, 1
(TISTA/LSK) OTS price $1.10

McDonnell Aircraft Corp., St. Louis, Mo.
MOLYBDENUM STRUCTURAL COMPONENT PROGRAM.

Progress rept., 1 Feb- May 63
1 May 63, 7p.
Contract NOw61 0653

Unclassified report

Descriptors: *Wings, Sheets, Trailing control surfaces, Sandwich construction, Structural parts, Sandwich panels, Manufacturing methods, Airframes, Control surfaces, Molybdenum alloys.

The design and analysis of the final component control surface was completed. The control surface will be located at the wing trailing edge. This component of TZM molybdenum is composed of a combination truss-crimped web substructure covered with corrugated panels on the mold line surfaces. Attachment of the panels to the substructure is made at the corners by threaded attachments in oversize holes to allow for thermal expansion. The panels carry only air loads while the substructure provides capabilities for carrying shear, bending and torque loads. The hinge line is located along the forward rib so that a 20 degree movement can be attained either up or down, similar to conditions expected on a reentry vehicle. (Author)

AD-404 215 Div. 17, 14
(TISTM/AMS) OTS price $1.60

Aerojet-General Corp., Azusa, Calif.
INVESTIGATION OF STRESS-CORROSION CRACKING OF HIGH-STRENGTH ALLOYS.
Informal monthly rept. no. 22, 1-28 Feb 63,
by R. B. Setterlund. May 63, 4p. L0414 01 22
Contract DA04 495ord3069

Unclassified report

Descriptors: *Fracture (Mechanics), Alloys, Titanium alloys, Aluminum alloys, Vanadium alloys, Steel, Nickel alloys, Cobalt alloys, Corrosion, Stresses, Low pressure research, Welds, Cold working, Aging (Materials), Controlled atmospheres, Coatings, Protective treatments, Test methods, Epoxy plastics, Plastic coatings, Rocket cases.

AD-404 226 Div. 17, 26
(TISTM/AMS) OTS price $.50

Naval Research Lab., Washington, D. C.
PREPARATION AND PROPERTIES OF CONSUMABLE-ELECTRODE VACUUM-ARC-MELTED ELECTROLYTIC IRON,
by R. W. Huber. 17 Apr 63, 12p.
NRL 5928

Unclassified report

Descriptors: *Iron, *Low pressure research, Cold working, Degasification, Forging, Density, Microstructure, Impurities, Processing, Purification, Experimental data, Ductility, Hardness, Tensile properties, Toughness, Wire, Electrodes, Magnetic properties, Thermoelectricity, Resistance (Electricity), Grain structure (Metallurgy), Castings, Manufacturing method.

Oxygen was removed from a relatively pure grade of electrolytic iron by a solid-state, hydrogen, reduction treatment prior to vacuum arc melting. Consumable electrode arc melting into a water-cooled copper crucible excluded contamination. The initial oxygen content of 400 ppm was reduced to below 50 ppm in the ingot. The values of various physical (density, electrical resistivity, thermoelectric force, and magnetic) and mechanical (tensile strength, Charpy V notch, and hardness) properties were measured to assess the quality of this iron, which compares favorably with research grades described in the literature. (Author)

AD-404 232 Div. 17
(TISTM/BRW) OTS price $1.10

Southern Research Inst., Birmingham, Ala.
MECHANICAL AND PHYSICAL PROPERTIES OF TZM MOLYBDENUM ALLOY SHEET AND OF TUNGSTEN SHEET,
Progress rept. no. 2, 1 Mar-30 Apr 63.
by J. A. Hamilton. 14 May 63, 4p. 5898 1479 2
Contract N600 19 59530

Unclassified report

Descriptors: *Molybdenum alloys, *Tungsten, Sheets, Titanium alloys, Thickness, Mechanical properties.

The purpose of this program is to determine preliminary design data for tungsten and TZM molybdenum sheet produced in Phase I of the Refractory Metal Sheet Program. Since the experimental materials from Phase I of the Refractory Metal Sheet Program were not received, no work on the actual evaluations was possible. However, some work was done to prepare the apparatus and special fixtures that will be needed for the planned experimental program. (Author)

AD-404 272 Div. 17
(TISTM/BRW) OTS price $8.10

Battelle Memorial Inst., Columbus, Ohio.
COATINGS FOR TANTALUM-BASE ALLOYS.
Rept. for 1 Jan-31 Dec 62,
by J. B. Hallowell, D. J. Maykuth, and H. R. Ogden. Apr 63, 80p.
Contract AF33 657 7909, Proj. 7312, Task 731201
ASD TDR63 232 Unclassified report

Descriptors: *Tantalum alloys, Tungsten alloys, Niobium alloys, Vanadium alloys, Hafnium alloys, Silicides, Refractory coatings, Aluminum compounds, Boron compounds, Manganese compounds, Vanadium compounds, Oxidation, Chromium compounds, Microstructure, Cobalt compounds, Iron compounds, Tensile properties, Silicon coatings, Antioxidants, Coatings.

Silicide coatings, applied by pack cementation, were evaluated on a variety of tantalum alloys including Ta-10W, Ta-30Cb-7.5V, and Ta-8W-2Hf. Modification of the silicide, by diffusion with the underlying substrates, resulted in significant differences in oxidation behavior. Similar effects were obtained by incorporating aluminum, boron, and manganese additions in the silicide coating. Of the modifiers studied, vanadium was found to be most beneficial in improving the protective life of silicide coatings at low as well as high temperatures. Straight silicide coating of Ta-30Cb-7.5V alloy had no detrimental effect on room-temperature properties and provided useful lives in dynamic as well as static oxidation testing at temperatures to 3000 F. Modifications of the silicide with boron and vanadium show further improvements in static oxidation performance at temperatures from at least 1800 through 2900 F. (Author)

AD-404 296 Div. 17, 4
(TISTM/PCR) OTS price $5.60

Westinghouse Research Crop., Baltimore, Md.
A STUDY OF THE ADSORPTION MECHANISMS ON OXYGEN ELECTRODES.
Semi-annual rept. no. 1, 6 Sep-31 Dec 62,
by Y. L. Sandler. 29 Jan 63, 36p.
Contract DA36 039AMC00136

Unclassified report

Descriptors: *Electrodes, *Oxygen, Gold, Gold alloys, Silver, Silver alloys, High temperature research, Spark machining, Powder

metals, Palladium, Radioactive isotopes, Silver compounds, Vanadates, Pressure, Temperature, Hydrogen, Water vapor, Chemisorption, Dissociation, Exchange reactions, Isotopes, Adsorption.

An improved method for studying the exchange of oxygen with O18 pre-adsorbed on a metal surface is reported. Detailed information on the nature of the chemisorbed oxygen on silver and the isotopic exchange mechanism at 200 C was obtained. The rates of chemisorption and dissociation were determined, which are two distinct processes beyond a certain oxygen coverage. Oxygen pressure versus temperature characteristics and isotopic exchange reactions on carefully cleaned silver and silver-gold alloy powder surfaces are reported. The powders were all prepared by a spark erosion method. A strong increase in the exchange activity was obtained at elevated temperatures by dilution of the silver. With pure silver at room temperature a dissociative oxygen exchange was observed which decreased with time. A palladium powder (of commercial origin) was active only above 100 C. (Author)

AD-404 460 Div. 17, 25
(TISTM/AMS) OTS price $3.60

Aerospace Corp., Los Angeles, Calif.
CORRELATION AND INTERPRETATION OF HIGH-TEMPERATURE MECHANICAL PROPERTIES OF CERTAIN SUPERALLOYS, by H. Conrad, J. White, and E. Bernett. 11 Mar 63, 26p. TDR169 3240 11 TN1
Contract AF04 695 169
SSD TDR63 26

Unclassified report

Descriptors: *Heat resistant metals and alloys, *Correlation techniques, Tensile properties, Compressive properties, Iron alloys, Nickel alloys, Equations, Crystal lattice defects, Experimental data, Theory, Stresses, Creep, Heat of activation, Mathematical analysis, Diffusion, Chromium alloys, Molybdenum alloys, Tungsten alloys, Tantalum alloys, Niobium alloys, Microstructure, Mechanical properties.

AD-404 461 Div. 17, 25
(TISTM/AMS) OTS price $1.60

Connecticut U., Storrs.
METALLURGICAL FACTORS INFLUENCING THE MAGNETIC ANALYSIS OF SURFACE HARDENED AND TEMPERED STEEL. Final technical rept., by Edward L. Bartholomew, Jr. and Ronald R. Biederman. 5 Apr 63, 17p. 1
Contract DA19 0200RD5747

Unclassified report

Descriptors: *Steel, Magnetic properties, Surface properties, Heat treatment, Hardening, Stresses, Austenite, Experimental data.

A nondestructive evaluation of the effects of surface residual stress and untransformed austenite on the magnetic analysis of steel shows a quantitative relationship between magnetic imbalance and surface residual stress in carburized and hardened H-8620 steel. Stresses were progressively relaxed by low temperature tempering holding retained austenite constant. Effects of retained austenite on magnetic imbalance were found to be small and of the order of magnitude of orientational effects attributed to banding. (Author)

AD-404 466 Div. 17, 26, 4, 25
(TISTM/AMS) OTS price $6.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
BERYLLIUM: AN ANNOTATED BIBLIOGRAPHY, JULY - SEPTEMBER 1962. SUPPLEMENT II, comp. by Jack B. Goldmann. Apr 63, 59p.
SB62 22; 3 80 62 30

Unclassified report

Descriptors: *Beryllium, Welding, Intermetallic compounds, Beryllium alloys, Abstracts, Zirconium alloys, Titanium alloys, Soldering alloys, Patents, Quenching (Cooling), Tellurium alloys, Antimony alloys, Test methods, Magnesium alloys, Gamma rays, Spectroscopy, Chemistry, Mechanical properties, Sandwich panels, Analysis, Chemical analysis, Oxides, Sulphur, Beryllium compounds, Crystal structure, Extrusions, Manufacturing methods, Mechanical working, Powder metallurgy, Processing, Corrosion, Bonding, Sheets, Bibliographies.

The annotated bibliography covers publications released during the third quarter of 1962. Citations are arranged alphabetically by author under the broad subject headings of Alloys; Analysis; Applications; Bibliographies; Compounds; Corrosion; Fabrication Techniques; Joining; Mineralogy; Oxides; Powder Metallurgy and Casting; Processing; Properties; and Miscellaneous. Reference to the use of beryllium in fuels, nuclear reactor applications, effects of radiation, and Cu-Be alloys have been omitted. The resources of Lockheed Missiles and Space Company Technical Information Center were utilized in the preparation of the bibliography. (Author)

AD-404 485 Div. 17, 26
(TISTM/PCR) OTS price $3.60

Madrid U. (Spain).
PROPERTIES OF FERROMAGNETIC MATERIALS INSIDE THE MATRIX OF ANODIZED ALUMINUM COATS. Final technical rept., 1 Jan-31 Dec 62, by J. M. Alameda. 31 Dec 62, 32p.
Contract DA91 591EUC2044

Unclassified report

Descriptors: *Ferromagnetic materials, *Anodes, Coatings, Impregnation, Copper compounds, Silver compounds, Sulfides, Acids, Electrolytes, Porous materials, Electrical conductance, Manufacturing methods, Electrolysis, Diffusion, Nickel, Plating, Magnetic properties, Anisotropy, Electrodeposition, Iron, Cobalt, Microstructure, Cyanides, Iron compounds, Electroplating, Thickness, Metal films, Hysteresis, Aluminum coatings, Oxidation.

Anodic coatings can be made highly conductive by proper impregnation with copper or silver sulphide. No other compound from about thirty tried were able to impart substantially this property to the coating. The above results confirm that acid electrolyte anodic coatings, while in part porous, have an internal barrier layer at the bottom of the coating between the aluminium base and the porous part. The barrier layer can be made conductive probably in reason of one or a combination of the following processes: (1) by tunneling effect, if the barrier is thin enough for the voltage applied; (2) by electrolytic diffusion of copper or silver ions under the action of an electric field; and (3) by a doping action taking place at the barrier during the impregnating process. (Author)

AD-404 487 Div. 17, 14, 26
(TISTM/AMS) OTS price $18.50

Applications Lab., Aeronautical Systems Div., Wright-Patterson Air Force Base, Ohio.
AN INDEX TO METALS R&D PROGRAMS OF SEVEN AEROSPACE COMPANIES.
11 Feb 63, 295p.
Task 738103
ASRCE TM62 24 Unclassified report

Descriptors: *Metals, *Bibliographies, *Abstracts, Indexes, Brazing, Bonding, Chemical milling, Heat treatment, Welding, Hot working, Protective treatments, Tensile properties, Mechanical properties, Corrosion, Aluminum alloys, Powder metals, Soldering alloys, Beryllium, Coatings, Cobalt alloys, Niobium alloys, Molybdenum, Molybdenum alloys, Nickel alloys, Stainless steel, Steel, Tantalum, Tantalum alloys, Titanium alloys, Zirconium alloys, Carbides, Scientific research.

This index (Appendix I) covers 235 annotated abstracts describing metals R&D programs being conducted by seven aircraft companies. All of the programs described are recent and many of them are still in progress. It should be noted that the index also includes a few non-metallics which only indicates that a few programs mentioned overlap into the non-metallics area. The abstracts included in Appendix II were submitted by the following companies as a partial requirement of several data compilation contracts sponsored by the Information Processing Section of the Applications Laboratory: The Boeing Company (All Divisions); General Dynamics (Astronautics); General Electric (Evendale); McDonnell Aircraft; North American Aviation (All Divisions); The Northrop Corp (Norair); and Solar Aircraft. (Author)

AD-404 495 Div. 17
(TISTM/AMS) OTS price $.50

Naval Research Lab., Washington, D. C.
TENSILE AND IMPACT PROPERTIES OF SOME MARAGING STEEL COMPOSITIONS,
by J. E. Srawley and T. C. Lupton. 23 Apr 63, 6p.
NRL 5916
Unclassified report

Descriptors: *Steel, *Aging (Materials), Nickel alloys, Cobalt alloys, Molybdenum alloys, Titanium alloys, Boron alloys, Zirconium alloys, Aluminum alloys, Heat treatment, Toughness, Tensile properties, Impact shock, Tests, Experimental data, Low temperature research, Submarine hulls, Martensite, Mechanical properties.

Laboratory vacuum induction heats of 18%-Ni maraging steels were cast into 25-pound ingots and forged into flat bar stock. Transverse tensile and Charpy V specimens were obtained from the forged material. One composition contained 8.4% Co, 3.2% Mo, and 0.2% Ti; five others contained 7% or 9%e Co and 3.2%, 3.8%, or 5% Mo, but no titanium. Specimens were aged at various temperatures up to 1000 F, and Charpy V and tensile properties were determined at room temperature. Charpy V tests were also conducted at 30 and -20 F. The titanium-containing composition consistently developed considerably better combinations of Charpy V toughness and yield strength than did the others. (Author)

AD-404 518 Div. 17, 25
(TISTP/MH) OTS price $1.60

Aerospace Corp., Los Angeles, Calif.
VARIATION OF DISLOCATION DENSITY AND STORED ENERGY WITH GRAIN SIZE,
by H. Conrad and B. Christ. 13 Mar 63, 7p.
TDR169 3240 11TN6
Contract AF04 695 169
SSD TDR63 31 Unclassified report

Descriptors: *Metals, Density, Grain structures (Metallurgy), Metallic crystals, Metallography, Metallurgy, Deformation, Plasticity, Energy.

The stored energy of metals (due to the dislocation density resulting from deformation) increases for a given strain as grain size decreases. This variation with grain size becomes less as the strain increases. This variation of dislocation density with grain size is explained in terms of the average distance the dislocations move during deformation. Dislocation densities, which are in good agreement with densities counted from electron transmission micrographs, are calculated on the basis of this interpretation. It is also found that the variation with strain of the average distance of dislocation motion is in agreement with the observed change in deformation cell size and strain. (Author)

AD-404 519 Div. 17, 25
(TISTM/AMS) OTS price $6.60

Aerospace Corp., Los Angeles, Calif.
YIELDING AND FLOW OF THE BODY CENTERED CUBIC METALS AT LOW TEMPERATURES,
by Hans Conrad. 7 Mar 63, 59p. TDR169 3240 11TN5
Contract AF04 695 169
SSD TDR63 30 Unclassified report

Descriptors: *Transitional elements, *Low temperature research, Iron, Molybdenum, Niobium, Tantalum, Tungsten, Vanadium, Chromium, Steel, Impurities, Experimental data, Thermal stresses, Tensile properties, Stresses, Plasticity, Crystal lattices, Crystal structure, Single crystals, Crystals, Mathematical models, Nucleation, Temperature, Cryogenics, Heat of activation.

AD-404 583 Div. 17
(TISTP/MH) OTS price $1.60

Boeing Scientific Research Labs., Seattle, Wash.
THE MICROSCOPY OF METALS IN TRANSMITTED ULTRAVIOLET LIGHT,
by A. J. Forty. Mar 63, 9p. D1 82 0240
Unclassified report

Also available from the author.

Descriptors: *Microscopy, Metals, Ultraviolet radiation, Wave transmission, Metallurgy, Alkalic metal alloys, Alkalic metal compounds, Silver, Silver alloys, Chemical precipitation, Metallography, Potassium alloys, Impurities.

It is suggested that transmission ultraviolet light microscopy might provide a useful technique for metallurgical studies of the alkali metals and of silver and silver-based alloys. It is possible that this technique, providing the resolution of detail permissible with good optical microscopy for the examination of fairly thick metallic specimens, will fill the gap between transmission electron microscopy and X-ray diffraction topography for metallographic observation. Of the many potential applications the detection of microstructure by decorating techniques, the study of precipitation and other chemical reactions inside metals and the direct observation of phase changes are listed as those which are likely to be of immediate interest. The paper presents some results of a preliminary

investigation of the microstructure in specimens of potassium, using impurity decoration and ultraviolet light microscopy, to demonstrate the experimental feasibility of these proposals. (Author)

AD-404 589 Div. 17, 1
(TISTM/AW) OTS price $1.10

General/Convair, San Diego, Calif.
MATERIAL - ALUMINUM - 2024-T86 CORROSION EVALUATION, SERVICE ITEMS,
by J. C. George and W. M. Sutherland. 31 Aug 61, 6p. 8926 156
Contract AF33 657 8926

Unclassified report

Descriptors: *Aluminum alloys, *Airplane panels, Coatings, Sea water, Jet engine fuels, Corrosion.

Two F-102 airplane wing access doors received about five years subsequent to manufacture were examined for corrosion damage incidence. The doors were made of clad 2024-T86 aluminum alloy and their exterior surfaces were originally treated with Alodine 600 chemical and coated with a baked Scotchweld primer. Upon receipt, the primer was missing from interior surfaces accessible to fuel impingement. These areas exhibited corrosion pitting ranging 6 to 35 mils depth and 20 to 120 pits per door as a result of general corrosive attack which appeared to have been caused by marine atmosphere impingement. Examination revealed that the clad 2024-T86 aluminum alloy was normal with respect to intergranular corrosion susceptibility. (Author)

18. MILITARY SCIENCES AND OPERATIONS

AD-403 703 Div. 18
(TISTP/FR) OTS price $6.60

Teleregister Corp., Stamford, Conn.
INTEGRATED ON-LINE SYSTEMS APPROACH TO NAVY SUPPLY OPERATIONS INPUT/OUTPUT DEVICES. VOLUME 3.
1 Feb 62, 55p. ER105
Contract Nonr340800

Unclassified report

Descriptors: *Naval procurement, *Input-output devices, Punched cards, Data processing systems, Data storage systems, Data transmission systems, Logistics.

A continuation of the study of the application of on-line data processing techniques to the Navy Supply System is presented. Volumes 1 and 2 (AD-226 190 and AD-266 189), presented on July 14, 1961, included the derivation of functional, data transmission, and data storage requirements of the total Navy Supply System. In addition, these volumes included discussions of various systems and hardware configurations, and developed estimates of total systems costs. This report (Volume 3) presents the results of a study of the input/output requirements of the system. It discusses input/output systems and hardware, and develops estimates of the costs of specific input/output devices. (Author)

AD-403 704 Div. 18
(TISTP/FR) OTS price $1.60

Teleregister Corp., Stamford, Conn.
EXECUTIVE SUMMARY OF THE FINAL REPORT FOR INTEGRATED ON-LINE SYSTEMS APPROACH TO NAVY SUPPLY OPERATIONS.
July 61, 18p. ER105S
Contract Nonr3408 00

Unclassified report

Descriptors: *Naval procurement, Logistics, Data processing systems, Data storage systems, Data transmission systems.

The application of integrated on-line data processing techniques to the total Naval Supply System implies a nation-wide data processing and communications system operating on a 24-hours-per-day basis. Users and management would have immediate access to the toal supply situation at all times by means of a communications network linking stock points, ICPs, management control points, customer locations, and data processing centers. Transactions (inquiries, requisitions, receipts, reconciliations, etc.) are entered at random into the system through remote on-line input/output devices located at convenient user locations. Each transaction is immediately transmitted via the communications system to the processor site where, according to its type and content, files are searched, processed and updated, required action messages are generated and transmitted, and the originator is immediately notified of the action taken on his transaction. (Author)

AD-403 829 Div. 18, 26
(TISTM/DGH) OTS price $8.60

Cornell U., School of Hotel Administration, Ithaca, N. Y.
A MANUAL FOR THE MANAGEMENT OF FOODS IN LICENSED FALLOUT SHELTERS,
30 Apr 63, 83p.
Contract OCD OS62 49

Unclassified report

Descriptors: *Civil Defense Systems, *Food dispensing, Decontamination, Classification, Management engineering, Heating, Costs, Lighting equipment, Nutrition, Food, Storage, Wastes (Sanitary engineering), Sanitary engineering, Water, Distribution, Abnormal psychology, Behavior, Radiation injuries, Confined environments, Reaction (Psychology), Adaptation (Physiology), Fear, Sleep, Adjustment (Psychology).

Contents: Shelter classifications; the scope of the manual; the purpose of the manual; the selection of the staff; the philosophy; the organization and authority; the policy of management; problems of space; facilities and equipment; temperature and humidity; heating equipment and costs; lighting requirements; schedule of operations; daily activity; the nature of the basic ration; the storage of food; stockpiling of food for overflow or emergency use; the selection of food; the conservation of food and water; sanitary regulations for food handlers; waste disposal; preparation of food; the distribution of water; the distribution of food; the nutritional value of foods; sample shelter menu; problems of abnormal behavior; problems of deprivation; post shelter adjustment; problems with contaminated water and food; decontamination processes; post shelter psychological problems; radiation sickness; and references.

AD-404 010 Div. 18, 32
(TISTP/JEA) OTS price $3.60

RAND Corp., Santa Monica, Calif.
STRATEGIC AMBIGUITY, ASYMMETRY AND ARMS CONTROL: SOME BASIC CONSIDERATIONS,
by Harvey Averch. Mar 63, 26p. RM3426 PR
Contract AF49 638 700

Unclassified report

Descriptors: *Disarmament, *Strategic warfare, National Defense, Armament, Control, Analysis, Civil Defense Systems, Budget, Weapon systems, Feasibility studies.

This study investigates the conditions under which some types of arms control agreements, even when there is adequate inspection and verification, may be used as a tool by the Soviet Union to achieve strategic objectives that are undesirable or dangerous to the United States, given current U. S. strategic superiority and the asymmetries in the force structures of both nations. Sets of objectives and postures are examined in a dynamic context to determine those sets that could produce future arms agreements and the types of agreements that might be produced. (Author)

AD-404 191 Div. 18
(TISTM/LMH) OTS price $7.60

Technical Operations, Inc., Burlington, Mass
THE CIVIL DEFENSE ROLE OF RADIO BROADCASTING IN THE POSTATTACK PERIOD.
Final rept.,
by M. Owens and D. Schimelfenyg. 7 Jan 63, 1v.
B62 74
Contract OCD OS62 31

Unclassified report

Descriptors: *Nuclear warfare, *Communication systems, *Radio broadcasting, Networks, Commerce, Transportation, Mobile, Radio communication systems, Shelters, Site selection, Civil defense systems.

A study was made of the requirements for mass information dissemination following a thermonuclear attack upon the United States. The individual information requirements deemed necessary are listed, and AM radio is discussed as the logical disseminator of this information. The discussion centers on the existing AM standard broadcast radio network, including unique transmitters that might be located at emergency operating centers and on mobile radio stations. Essentials of an efficient broadcasting system for the postattack period are determined, and are compared to those of the existing system. It is concluded that postattack information broadcasting is essential to the survival of the shelter population and may be accomplished by a modification of the present system, including the hardening of broadcasting sites and the addition, where necessary, of special-purpose transmitters. Recommendations for changing and supplementing the radio network of the United States are made. (Author)

AD-404 192 Div. 18
(TISTM/LMH) OTS price $2.60

System Development Corp., Santa Monica, Calif.
CIVIL DEFENSE WARNING REQUIREMENTS STUDY.
Summary rept.
31 Jan 63, 23p. TM L900 000 01
Contract OCD OS 62 119

Unclassified report

Descriptors: *Early warning system, *Civil defense system, Warning systems, Shelters, National defense, Protective coverings, Effectiveness, Public opinion, Defense systems.

The objective of this research effort was to determine warning system effectiveness in meeting the present and future needs for warning. Program objectives are as follows: (1) a detailed study of the requirements for warning in the late 60's and early 70's, including an evaluation of the need for outdoor and indoor warning devices and other warning systems which are capable of transmitting identifiable signals to the general population; (2) an analysis and evaluation of the effectiveness of the warning system in meeting the needs for warning of attack and for determining what role the system plays in providing warning of radiological, chemical, and biological hazards; (3) an identification of the cost-effectiveness of feasible warning systems and programs for the present and future, considering strategic needs in the late 60's and early 70's, and the likely performance requirements of the warning system; (4) an identification of training requirements, formulation of an over-all training plan, and evaluation of the use of simulation techniques and tactical exercises as training devices; and (5) the development of testing procedures which are capable of measuring operational readiness both independently and in conjunction with the training plan. (Author)

AD-404 292 Div. 18
(TISTM/DGH) OTS price $19.75

System Development Corp., Santa Monica, Calif.
CIVIL DEFENSE WARNING REQUIREMENTS STUDY.
31 Jan 63, 319p. TM L 900 001 01
Contract OCD OS62 119

Unclassified report

Descriptors: *Warning systems, *Civil Defense Systems, Costs, Training, Test construction, Hazards, Reaction (Psychology), Radio broadcasting, Standards, Effectiveness.

The objective of this research effort was to determine warning system effectiveness in meeting the present and future needs for warning. Program objectives are as follows: (1) a detailed study of the requirements for warning in the late 60's and early 70's, including an evaluation of the need for outdoor and indoor warning devices and other warning systems which are capable of transmitting identifiable signals to the general population; (2) an analysis and evaluation of the effectiveness of the warning system in meeting the needs for warning of attack and for determining what role the system plays in providing warning of radiological, chemical, and biological hazards; (3) an identification of the cost-effectiveness of feasible warning systems and programs for the present and future, considering strategic needs in the late 60's and early 70's, and the likely performance requirements of the warning system; (4) an identification of training requirements, formulation of an over-all training plan, and evaluation of the use of simulation techniques and tactical exercises as training devices; and (5) the development of testing procedures which are capable of measuring operational readiness both independently and in conjunction with the training plan. (Author)

AD-404 378 Div. 18
(TISTM/DGH) OTS price $7.60

AC Spark Plug Div., General Motors Corp., Flint, Mich.
DEVELOPMENT OF PROCEDURES FOR NON-ALERT TESTING OF OUTDOOR ATTACK WARNING SYSTEMS.
Final rept. 2 Mar-22 Oct 62,
by W. Sattler. Oct 62, 1v.
Contract OCDOS62 50

Unclassified report

Descriptors: *Warning systems, *Early warning systems, *Civil defense systems, Circuits, Test equipment, Public opinion, Effectiveness, Test methods, National defense.

General information on 12 landline controlled and 7 radio controlled warning systems currently in operation in this country and any unique systems

or testing procedures presently used was obtained from OCD offices. Analysis of this cross-section of data provided an understanding of the general objectives and problems associated with outdoor attack warning systems commonly used in the United States. Two concepts resulted for non-alert testing all outdoor warning systems that are being used at the present time. The major features of the two concepts include the following items. The Silent Testing concept: no sound when testing system; and frequency of tests unlimited. The Minimum Sound concept: the total system is tested; all equipment is exercised during test; daily tests are feasible; and equipment modifications are minor. (Author)

AD-404 690 Div. 18, 30
(TISTP/WH) OTS price $1.60

System Development Corp., Santa Monica, Calif.
SAGE UNIQUE-TO-SITE ENVIRONMENTAL DATA AND EQUIPMENT ASSIGNMENTS GRAND FORKS ADS,
by D. M. McDaniel. 22 Mar 63, 14p. TM ADC820 291 00A
Contract AF19 628 1648
Unclassified report

Descriptors: *Air Defense Command, *Programming (Computers), *Digital computers.

19. NAVIGATION

AD-403 980 Div. 19, 12, 30
(TISTP/JEA) OTS price $18.50

Air Force Missile Development Center, Holloman Air Force Base, N. Mex.
PROCEEDINGS OF THE AFMDC INERTIAL GUIDANCE TEST SYMPOSIUM. VOLUME I, 16-17 OCTOBER 1962.
1963, 1v.
Unclassified report

Descriptors: *Inertial guidance, *Symposia, Gyroscopes, Accelerometers, Standards, Error, Tracking, Tests methods, Statistical processes, Time signals, Automatic, Test equipment, Guided missiles, Rocket-propelled sleds, Centrifugal fields, Centrifuges, Data processing systems, Guided missile computers, Reliability, Non-destructive testing, Instrumentation, Calibration, Servomechanisms, Celestial navigation, Timing circuits, Test facilities.

Contents:
Precision Measurement of Accelerometer Higher Order Non-linearities; Simplification of Inertial Component Test Equipment; Central Inertial Guidance Test Facility Laboratory Standardization Efforts; Accelerometer Error Coefficients Derived From Track Tests; Testing of Stellar Inertial Guidance Systems; A Long Hard Look at Guidance System Testing; Band Concept Versus Statistical Method In Guidance Testing; The Space-Time Measuring System of the Holloman Track; Versatile Automatic Test Equipment For Inertial Guidance Systems; Guidance System Evaluation Using The Guidance Evaluation Missile; Inertial Guidance Equipment Testing on the MIT Centrifuge.

AD-404 448 Div. 19, 6
(TISTE/CRJ) OTS price $8.60

General Electric Co., Syracuse, N. Y.
AIR WEAPONS CONTROL SYSTEM 412L.
Quarterly reliability program rept. no. 8.
1 Apr 63, 86p. AWCS SQR8R1
Contract AF19 628 513
Unclassified report

Descriptors: *Aircraft intercept control systems, *Reliability (Electronics), Maintenance, Radar equipment, Search radar, Radar tracking, Environmental tests, Data processing systems, Display systems, Identification systems, Height finding, Power supplies, Air control centers, Transistors, Diodes (Semiconductors), Capacitors, Resistors, Coils, Transformers, Printed circuits, Electronic relays, Delay lines, Failure (Mechanics).

AD-404 575 Div. 19, 5
(TISTE/CAM) OTS price $5.60

Navy Electronics Lab., San Diego, Calif.
FIELD STRENGTH RECORDER FOR VERY LOW FREQUENCIES,
by J. C. Hanselman. 11 Feb 63, 56p.
NEL1158 Unclassified report

Descriptors: *Radio navigation, *Radio fields, *Measuring devices, Radio equipment, Signal-to-noise ratios, Switching circuits, Radio-frequency amplifiers, Radiofrequency oscillators, Detectors, Radiofrequency filters, Intermediate frequency, Very low frequency.

20. NUCLEAR PHYSICS AND NUCLEAR CHEMISTRY

AD-403 510 Div. 20
(TISTP/MFA) OTS price $1.10

Litton Systems, Inc., Woodland Hills, Calif.
(No title).
Progress rept.
Apr 63, 12p.
Contract AF33 657 10584
Unclassified report

Descriptors: *Light water reactors, Amplifiers, Radiation damage, Research reactors, Test equipment, Neutron lifetime, Foils, Neutrons, Tests.

AD-403 751 Div. 20
(TISTP/FEM) OTS price $2.60

Naval Radiological Defense Lab., San Francisco, Calif.
CALORIMETRIC MEASUREMENTS OF GAMMA RAY, FAST NEUTRON, AND CHARGED PARTICLE ABSORBED DOSES,
by E. R. Schleiger, N. Goldstein, and E. Tochilin. 28 Jan 63, 28p.
NRDL TR621
Unclassified report

Descriptors: *Cyclotrons, *Gamma rays, *Fast neutrons, *Alpha particles, Aluminum, Carbon, Calorimeters, Exposure, Dose rate, Ionization chambers, Temperature, Graphite, Sensitivity, Synchrocyclotrons, Errors, Neutrons, Absorption, Energy, Measurement.

The energy absorbed by aluminum, carbon, or tissue-equivalent (TE) material when exposed to gamma rays, fast neutrons, or 900-Mev alpha particles was measured with a microcalorimeter. The instrument has an ethylene glycol bath instead of water. Spaced mylar sheets about 6-1/2 in. in diameter were mounted on one side of the absorber inside the evacuated cylindrical chamber in order that the detector could be thermally insulated in the direction of the beam without

the presence of bath solution. Gamma-ray absorbed dose rates as low as 2 rads/min were measured with the instrument. The dose rates obtained from the exposures to Co-60 and Cs-137 sources at this Laboratory (NRDL) agreed with the output of the sources as measured with a National Bureau of Standards secondary standard cavity ionization chamber. Thirteen 10-min exposures of the TE absorber in the microcalorimeter to fast neutrons from a 60-in cyclotron resulted in absorbed dose measurements varying from 24 to 40 rads. The average absorbed dose value was 5% higher than the NRDL determination based on flux and spectrum measurements. Microcalorimeter exposures to the 900-Mev alpha particle beam from a 184-in. synchro-cyclotron gave absorbed doses that agreed reasonably well with ionization chamber determinations. (Author)

AD-403 762 Div. 20
(TISTE/JBM) OTS price $3.60

Ion Physics Corp., Burlington, Mass.
FEASIBILITY AND DESIGN STUDY FOR ELECTROSTATIC GENERATORS.
Quarterly technical progress rept. no. 4, 16 Jan-15 Apr 63,
Comp. by F. J. McCoy, J. Lavelle, and C. N. Coenraads. 30 Apr 63, 29p.
Contract AF33 616 7230, Proj. 0(3 3145), Task 61081
Unclassified report

Descriptors: *Electrostatic generators, Electric insulation, Vacuum apparatus, Titanium alloys, Aluminum alloys, Molybdenum alloys, Electrodes, Epoxy plastics, Stainless steels, Vacuum seals, Dielectrics, Electric fields, Coatings, Ceramic coatings, Aluminum coatings, Surface properties, Mechanical properties, Velocity, Tests, Design.

Efforts were continued on a feasibility and design study for electrostatic generators. Progress was made in the study of high voltage insulation in vacuum. The superiority of titanium alloy Ti-7Al-4Mo as an electrode material over other high strength materials, which was determined with small electrodes, was confirmed for large area electrodes. Forty-five kv/mm was insulated over 1000 cm sq/ft areas with the titanium alloy and 35 kv/mm with stainless steel coated with an epoxy. Much time was lost due to malfunctions of the high speed shaft seal on the 1 - 3 kw generator. Although a reasonable pressure level can be maintained with the shaft spinning, oil vapor, which is an acknowledged enemy of vacuum insulation, accumulated in the system to the detriment of the electric field properties of the generator. Data has been obtained on the operation of vacuum-insulated generators. Using a smaller machine, the first power run has been made using dielectric-coated stator blades and a rotor system completely at shaft potential. (Author)

AD-403 771 Div. 20, 4
(TISTM/ODN) OTS price $1.60

Chicago U., Ill.
TRACER STUDIES ON THE OXIDATION OF UO2 IN ACIDIC AQUEOUS SOLUTION.
Final summary rept., pt. 2,
by John B. Hunt and Henry Taube. 22 Jan 63, 13p.
Contract Nonr212116, Proj. NR052 415
Unclassified report

Descriptors: *Uranium compounds, *Tracer studies, Isotopes, Ions, Oxidizers, Oxygen, Contamination, Hydrochloric acid, Chlorine, Experimental data, Solutions, Dioxides, Oxidation.

Experiments were done on the oxidation of UO2 in acidic solution. UO2(++) has been shown not to undergo rapid exchange of oxygen with the solvent, at least when the concentration of U(V) is kept low. A tracer experiment was performed to determine to what extent UO2 -oxygen is retained in the UO2(++) which is formed. The investigation is not complete, nor are the results entirely satisfactory, but they are suggestive of some interesting effects and seem worth reviewing in their present form. Difficulties which limited the work appeared in the isotope analysis of the UO2(++). A variety of blank experiments were performed. Results obtained were somewhat erratic. (Author)

AD-403 803 Div. 20, 4
(TISTM/ODN) OTS price $2.60

Chicago U., Ill.
HYDROGEN TRACER STUDIES ON THE REACTIONS OF URANIUM HYDRIDE WITH AQUEOUS OXIDIZING AGENTS. PART I.
Final rept.,
by John B. Hunt and Henry Taube. 14 Dec 62, 24p.
Contract Nonr212116, Proj. NR 052 415
Unclassified report

Descriptors: *Uranium compounds, *Tracer studies, Deuterated compounds, Labeled substances, Cerium compounds, Titanium compounds, Oxidizers, Chemical analysis, Isotopes, Solvates, Hydrochloric acid, Solutions, Inorganic acids, Chemical reactions, Zirconium compounds, Chlorides, Hydrides, Hydrogen.

A detailed investigation of the isotopic course of the reactions of uranium hydride with acids is described. The study was extended to include other oxidizing agents as well. Stoichiometry is a matter of considerable interest because all of the reagents used have the capacity to oxidize hydrogen; thus, it is of interest to learn to what extent hydrogen is evolved by their action. Preliminary results for CeH3 and TiH2 which are of interest for comparison purposes are also described. (Author)

AD-403 811 Div. 20
(TISTW/WH) OTS price $3.60

Aerospace Information Div., Washington, D. C.
SOVIET NUCLEAR RESEARCH REACTORS OF THE IRT-2000 TYPE. REVIEW OF SOVIET LITERATURE.
Rept. no. 6.
30 Apr 63, 33p.
AID P63 53
Unclassified report

Descriptors: *Research reactors, *Nuclear engineering.

This summary presents a detailed description of six Soviet experimental reactors of the IRT-2000 type, viz.: the Moscow IRT-2000 reactor, the Salaspils IRT-2000 reactor, the Tbilisi IRT-2000 reactor, the Tomsk IRT-2000 reactor, the Sverdlovsk IRT-2000 reactor, and the Malyye Dubny IRT-2000 reactor. (The name of each reactor indicates the city in which it is located.) The presentation includes background information, design features, reactor parameters, and information on experimental facilities and experiments conducted with the reactprs, together with illustrations and diagrams. The report is based on Soviet open literature. (Author)

AD-404 030 Div. 20, 14, 30
(TISTE/OHD) OTS price $7.60

Edgerton Germeshausen and Grier, Inc., Santa Barbara, Calif.
THERMOLUMINESCENT DOSIMETER COMPUTER-INDICATOR

Division 21 - NUCLEAR PROPULSION
Division 22 - ORDNANCE

SYSTEM.
Final engineering rept. 15 June-15 Oct 62 on Phase 2.
15 Oct 62, 66p. S221R
Contract NObsr85506, Task SF0110504
Unclassified report

Descriptors: *Dosimeters, *Phosphorescent materials, Calcium compounds, Fluorides, Manganese, Manufacturing methods, Manganese compounds, Temperature, Sensitivity, Computers, Electronic equipment, Luminescence.

Final design criteria were established for the thermoluminescent dosimeter computer-indicator. Techniques for the production of the CaF2: Mn phosphor, application of the phosphor to the dosimeter heater substrate, and electronic and mechanical design for the computer-indicator are described. Performance of the system, its reliability and accuracy are presented in as complete detail as is known. (Author)

AD-404 547 Div. 20
(TISTM/ODN) OTS price $6.60

Picatinny Arsenal, Dover, N. J.
COBALT-60 GAMMA RADIOLYSIS OF LIQUID DINITROGEN TETROXIDE,
by Thomas C. Castorina. May 63, 62p.
Proj. 599 25 001
PA TR3072 Unclassified report

Descriptors: *Nitrogen compounds, *Radiation chemistry, Chromatographic analysis, Gamma rays, Cobalt, Oxides, Chemical analysis, Nitrogen, Dose rate, Decomposition, Temperature, Reaction kinetics, Mass spectroscopy, Tables, Gases, Gas analysis, Radiation damage, Liquefied gases, Tetroxides.

The cobalt-60 gamma radiolysis of liquid dinitrogen tetroxide N204(1) has been investigated as a function of variations in temperature, gas-to-liquid volume ratio, dose rates, and method of N204(1) purification. The radiolytic products are shown to be N2, N20, and N205. The material balance of the 02 released at post-irradiation thermal equilibrium as compared with the calculated 02 derived from the production of N2 and N20 from N204 is good to within 10%. N204(1) is relatively radiation-resistant, having a G value of only 0.075, the ratio of N2 and N20 product formation being 2:1. The independence of product yields in relation to changes in dose rate indicates that radical-molecule processes are involved in product formation. An apparent induction period, observed at 0.4 Mrad per hour, is also shown to be independent of dose rate. The addition of argon to N204(1) has no effect on the radiolytic yields. The addition of 02, over the partial pressure range of 200-350 mm, results in a G value for N205 formation that is in excellent agreement with that for N205 formation from pure N204(1). Although the addition of 02 has no effect on the N20 formation, the induction period for N2 is eliminated and the amount of N2 is decreased by 80%. (Author)

AD-404 590 Div. 20, 22
(TISTP/MH) OTS price $6.60

Stanford Research Inst., Menlo Park, Calif.
TRANSMISSION BY THE EARTH'S ATMOSPHERE OF THERMAL ENERGY FROM NUCLEAR DETONATIONS ABOVE 50-KM ALTITUDE.
Technical rept. May 62-May 63,
by Thomas O. Passell. 30 Apr 63, 56p.
Contract OCD OS62 135, Proj. IMU4021 302
Unclassified report

Descriptors: *Nuclear explosions, Air burst, Upper atmosphere, Attenuation, Meteorology, Photometers, Absorption, Clouds, Haze, Thermal radiation.

The extensive literature on transmission of solar energy by the earth's atmosphere supports transmission estimates for the average clear day at sea level ranging from around 80% for vertical rays to around 15% for rays 5 degrees above horizontal. On the basis of 100% for a clear day, cloud transmission varies from around 30%, for light cloud, to around 3%, for a dense cloud. Transmission factors can be computed when the following more important atmospheric parameters are known: (1) thickness, liquid content, and droplet size of clouds; (2) size and volume concentration of solid haze particles; and (3) reflectivity of the earth's surface. Theoretically estimated upper limits to the unattenuated energy flux from a 1000-mt detonation (taken from a companion study to the present one), combined with the above estimates of atmospheric transmission, give ignition radii ranging from 250 km at 50-km burst height to 0 km at 240-km burst height for the average clear day at sea level. A conscious attempt has been made in this study to give upper limits to both transmission factors and energy fluxes. Thus, in real world situations, the ground effects are expected to be substantially less extensive and less intensive than these estimates would indicate. (Author)

AD-404 645 Div. 20
(TISTP/FEM) OTS price $2.60

General Atomic Div., General Dynamics Corp., San Diego, Calif.
A USE FOR RADIOISOTOPES IN ABLATION EXPERIMENTS,
by J. H. Tillotson. 6 Apr 61, 25p. 2117
Contract AF29 601 2207, Proj. 52
Unclassified report

Descriptors: *Ablation, *Tracer studies, Beta particles, Pulse height analyzers, Detectors, Radiation measurement systems, Radioactive decay, Gamma-ray absorption coefficients, Aluminum, Measurements, Scintillation counters, Radioactive isotopes.

An extension of the experimental ablation study, currently being conducted by the experimental group of the Orion Project, can be accomplished by the addition of radioactive tracers into the material of the ablation sample. The existing expanded plasma and shock apparatus would require only minor modification; moreover, the current program could be continued and conducted simultaneously with the proposed tracer program. (Author)

21. NUCLEAR PROPULSION

No Entries

22. ORDNANCE

AD-403 672 Div. 22

(TISTA/LSK) OTS price $1.60

Human Engineering Lab., Aberdeen Proving Ground, Md.
VISCOUS-DAMPING MECHANISMS AS APPLIED TO FOUR-

INCH ROCKET LAUNCHER MOUNT,
by Fred N. Newcomb. Feb 63, 12p.
HEL TN5 63

Unclassified report

Descriptors: *Rocket launchers, *Gun mounts, Antitank ammunition, Rockets, Damping, Viscosity, Elevation gear, Gun directors, Human engineering, Friction, Portable, Training gear.

Development is reported of a lightweight, variable, viscous-damping mechanism for a rocket-launcher mount. This development is based on the Human Engineering Laboratories' recent demonstration of the advantages and torsional rate parameters that viscous damping offers in tracking moving targets with a 'free' mount. A 'free' mount is defined as one which a single man can move simultaneously in elevation and azimuth without using handwheels or mechanical power. The chief advantage of a damping mechanism lies in it's ability to provide the gunner's muscular efforts with a smooth controlled resistance. Such a resistance reduces the conflict between the gunner's muscular coordination and the inertial characteristics of the rotating launcher. The gunner is then much less likely to show high-frequency alternation between leading and following a moving target. (Author)

AD-403 766 Div. 22
(TISTP/JEA) OTS price $3.60

Naval Ordnance Lab., White Oak, Md.
TRANSITION FROM SLOW BURNING TO DETONATION: FURTHER STUDIES OF THE FREE VOLUME AND THE LOW VELOCITY REGIME IN CAST PENTOLITE,
by Donna Price, J. F. Wehner, and G. E. Roberson.
12 Feb 63, 33p.
NOL TR63 18

Unclassified report

Descriptors: *Combustion, *Ignition lag, *Pentolite, Igniters, Ignition, Propagation, Detonation, Sensitivity, Explosive materials, Velocity, Propellants, Pressure, Time, TNT, Strain gage, Ionization, Statistical data, Distortion, Filters (Fluid).

No effect of free volume introduced near the ignition wire could be detected in the experimental pressure-time curves for confined burning of an explosive. Rupture of the DDT tubes in the region of confined burning, for shots exhibiting transition to detonation, occurs more than 100 micro sec after a pressure of 1 kbar is first attained; the plastic deformation of the tube requires more than 45 micro sec. The long duration of the confinement and the pressure rises observed indicate that initiating pressures for DINA and pentolite are reached in the burning area near the igniter. A 1/4-in. thick Lucite filter in the path of the subsonic ionization front, downstream from the burning area, has no detectable effect on the propagation of the front. This disturbance is therefore pressure-initiated and propagated; it is not a flame front. (Author)

AD-404 032 Div. 22
(TISTE/JWS) OTS price $5.60

Naval Ordnance Lab., Corona, Calif.
TRICHOTOMOUS SYSTEMS AND THEIR RELIABILITY,
by J. G. Rau. 1 Apr 63, 51p.
Task RMMO21 030/211 1/F009 08 001
NAVWEPS 7234

Unclassified report

Descriptors: *Reliability (Electronics), *Mathematical prediction, *Fuzes (Ordnance), Vector analysis, Mathematical logic, Reliability.

The construction of a reliability function and an investigation of its properties for systems of identical independent components are described. Each system can perform in three distinct ways that are generalizations of early, proper, and late (including infinitely late, or dudding) operation. Systems of prime concern are series and parallel systems, with applications to both series-parallel and parallel-series combinations. (Author)

AD-404 034 Div. 22
(TISTP/JEA) OTS price $1.60

Little, Arthur D., Inc., Cambridge, Mass.
SENSITIVITY OF CASED EXPLOSIVE MATERIALS TO IMPACT BY REGULAR FRAGMENTS.
Monthly rept. no. 10, 30 Nov-28 Dec 62.
28 Dec 62, 11p.
Contract DA19 020ord5617

Unclassified report

Descriptors: *Explosive materials, Firing test, Velocity, Fragmentation ammunition, Hypervelocity projectiles, Cartridge cases, High speed photography, Propellants, Range tables, Impact shock, Sensitivity, Detonation.

An experimental program dealing with the sensitivity to impact by regular fragments of certain cased explosives and propellants is discussed. The program is designed to aid in determining a more realistic quantity-distance relationship for the storage of ordnance explosive material. It is the intent of this project, through an experimental program, to establish a limiting fragment mass vs impact velocity relationship for the detonation of certain explosives and/or propellants enclosed in casings of different thicknesses. (Author)

AD-404 035 Div. 22
(TISTP/JEA) OTS price $1.60

Arthur D. Little, Inc., Cambridge, Mass.
SENSITIVITY OF CASED EXPLOSIVE MATERIALS TO IMPACT BY REGULAR FRAGMENTS.
Monthly rept. no. 11, 20 Dec 62-28 Feb 63.
28 Feb 63, 9p.
Contract DA19 020ORD5617

Unclassified report

Descriptors: *Explosive materials, Hypervelocity projectiles, Firing tests, Impact shock, Velocity, Fragmentation ammunition, Pentolite, Propellants, Range tables, Cartridge cases, RDX, TNT, Sensitivity, Detonation.

An experimental program dealing with the sensitivity of certain cased explosives and propellants to impact by high-velocity particles was discussed. The program was designed to aid in determining a more realistic quantity-distance relationship for the storage of ordnance explosive material. It was the intent of this project, through an experimental program, to establish a limiting fragment mass vs impact velocity relationship for the detonation of certain explosives and/or propellants enclosed in casings of different thicknesses. Tests conducted to date have confirmed the expected sensitivity of cased Pentolite. Limited firings with Cyclotol have not resulted in detonation even with velocities well in excess of those believed to be necessary. (Author)

Division 23 - PERSONNEL AND TRAINING

AD-404 220 Div. 22
(TISTM/AW) OTS price $1.60

Picatinny Arsenal, Dover, N. J.
EVALUATION OF PROPELLANT, M-6 LOTS BAJ-37536 AND BAJ-37537,
by H. Gultz. 24 Apr 63, 5p. 317733
Unclassified report

Descriptors: *Ammunition propellants, *Propellant grains, Aging (Materials), Discoloration, Quality control, Military requirements, Stability, Degradation.

An evaluation of two lots of the M-6 propellant was made: (1) to determine if suspect propellants meet the general requirements indicated in Specification JAN-P-309 (except for ash content and hygroscopicity), (2) to determine the nature of the yellow coloration of the suspect grains, (3) to determine the cause of disformation of grains, and (4) to determine if the reported condition co-exists in complete rounds of ammunition items containing subject propellants (of similar vintage). (Author)

AD-404 310 Div. 22
(TISTP/JEA) OTS price $2.60

Picatinny Arsenal, Dover, N. J.
GROWTH OF COMPOSITION B TYPE CHARGES,
by Robert T. Schimmel and Stanley J. Lowell.
Mar 63, 9p.
PA TM1133 Unclassified report

Descriptors: *Explosive materials, *Charges (Explosive), Bursting charges, Vacuum furnaces, Control, Temperature, Experimental data, Statistical data, Containers, TNT, Safety, Hazards, Growth.

The growth of Composition B-type charges was investigated because of its potential safety hazard during firing. The explosives tested were Composition B, Composition B/calcium silicate (99.5/0.5), Composition B4 and TNT. These explosives were either standard or vacuum melted and cast in XM83 Bursters. The interior of the burster tube was coated with either acid-proof black paint or MIL-P-22332 primer paint. Then these charges were subjected to 160 F for 15 days. The maximum growth (0.430 inch) was observed with Composition B when standard melted and cast into acid-proof black paint coated-burster tubes. The addition of calcium silicate, vacuum melting the explosive and changing the interior coating to MIL-P-22332 primer paint reduced the growth considerably but did not eliminate it. The tests showed that Composition B4, when cast into MIL-P-22332 primer paint coated burster tubes, yielded the least growth (0.070 inch). Explosive growth cannot be entirely eliminated. However, by loading below the top of the tube, the growth can be tolerated. (Author)

AD-404 389 Div. 22, 12, 30
(TISTP/JEA) OTS price $3.60

Picatinny Arsenal, Dover, N. J.
FEASIBILITY STUDY OF A MAGNETIC CORE COUNTING TECHNIQUE FOR VARIABLE TIME FUZING,
R. A. Resch and R. M. Gutter. Apr 63, 32p.
DA Proj. 51604012
PAT M1163 Unclassified report

Descriptors: *Counting methods, *Magnetic cores, *Timing devices, *Fuzes (Ordnance), Remote control systems, Semiconductor devices, Guided missiles, Fuze functioning elements, Feasibility studies, Oscillators.

A limited feasibility study recently conducted for a remote settable time fuze for a volley fired missile has shown that magnetic core counting techniques are very applicable. A long term need has existed for such a fuze for use in bomb, rocket, and missile applications. Based upon a particular set of requirements a breadboard model of a missile fuzing system was prepared which had the capability of being remotely set to times between 10 and 80 seconds in 0.1 second increments. The laboratory model consisted of a simulated launch control, including a presetter, and two separate fuzes. Tests were conducted at ambient temperature and the results indicated that accuracies within system specifications can be achieved. It was demonstrated that the presetter could remotely set a multiple number of missiles with a different functioning time for each fuze. A significant feature of the magnetic core counting fuze is its capability of being repeatedly reset for different times. Only a fraction of a second is required to preset a fuze which can then retain that setting for an indefinite period of time. (Author)

AD-404 454 Div. 22
(TISTP/JEA) OTS price $1.60

Picatinny Arsenal, Dover, N. J.
DIELECTRIC PROPERTIES OF SOME COMMON HIGH EXPLOSIVES,
by Edmund E. Walbrecht. May 63, 14p.
Proj. 502 05 021
PA TM1170 Unclassified report

Descriptors: *Explosive materials, *Dielectric properties, TNT, Frequency modulation, Resistance (Electrical), Capacitance, Tables, Frequency, Plastics explosives.

In connection with projects involving nuclear irradiation of explosives and studies of the feasibility of using dielectric heating for determining induction times and related experiments, it was required that various electrical properties of certain high explosives be known, such as resistivity, dielectric constant at both high and low frequencies, dissipation factor, and dielectric strength. Explosives to be measured included PBX, TNT, Composition B (Comp. B), Baratol, Octol, and PBX-9404. (Author)

23. PERSONNEL AND TRAINING

AD-403 670 Div. 23, 18
(TISTB/AW) OTS price $8.10

Applied Psychological Services, Wayne, Pa.
A CORE TRAINING PROGRAM FOR STATE LEVEL CIVIL DEFENSE PROGRAM PERSONNEL (APPENDICES),
by Dorothy E. Fletcher, Douglas H. Macpherson, and Arthur I. Siegel. 30 Apr 63, 293p.
Unclassified report

Descriptors: *Civil defense systems, Training, Scheduling, Control, Instruction manuals, Command and control systems, Classification, Job analysis.

AD-403 759 Div. 23, 18
(TISTB/AW) OTS price $15.00

Applied Psychological Services, Wayne, Pa.
A CORE TRAINING PROGRAM FOR STATE LEVEL CIVIL

DEFENSE PROGRAM PERSONNEL,
by Dorothy E. Fletcher, Douglas H. Macpherson, and Arthur I. Siegel. 30 Apr 63, 209p.
Contract OCD OS62 121
Unclassified report

Descriptors: *Civil defense systems, *Training, Classification, Command and control systems, Decision making, Scheduling, Control, Instruction manuals, Job analysis.

The purpose of this study was to derive information required for improving State level civil defense training and to apply this information to the development of required courses for achieving this purpose. In order to achieve this goal, research was first conducted to determine the training requirements for the governmental and auxiliary personnel that are needed to implement State civil defense operational plans. Second, training materials were developed to meet these requirements. (Author)

AD-403 828 Div. 23
(TISTM/WA) OTS price $6.60

Cornell U. School of Hotel Administration, Ithaca, N. Y.
A GUIDE FOR THE TRAINING OF FOOD MANAGERS OF LICENSED FALLOUT SHELTERS.
30 Apr 63, 61p.
Contract OCD OS62 49
Unclassified report

Suppl. to A Research Study - Food Service Procedure in Fallout Shelters, AD-403 714.

Descriptors: *Management engineering, *Food dispensing, *Radioactive fallout, *Shelters, *Training, Handbooks, Personnel management, Water, Civil defense systems, Foods.

This publication deals with that phase of the administration of the large public or semi-public radioactive fallout shelters which has to do with the management of the water and food problems. It is designed to serve as a guide for those responsible for planning, organizing and maintaining the facilities and the voluntary forces that will be needed for the shelters and the post-shelter functions. It describes the purposes, activities and responsibilities of the food manager and suggests policies, organizational patterns, and administrative practices. The discussion is largely limited to basic problems and principles. (Author)

AD-403 830 Div. 23, 28
(TISTB/AW) OTS price $4.60

6570th Personnel Research Lab., Aerospace Medical Div., Lackland Air Force Base, Tex.
CAREER EXPERIENCES OF AFIT CLASSES OF 1955 AND 1956,
by Francis D. Harding, Robert L. Downey, Jr., and Robert A. Bottenberg. Apr 63, 41p.
Proj. 6755, Task 675501
PRL TDR63 9
Unclassified report

Descriptors: *Job analysis, *Officer personnel, *Air Force, Attitudes, Psychometrics, Industrial psychology, Personnel management, Wages, Statistical data, Students, Training.

To determine the utilization, attitudes, and retainability of officers who participate in AFIT programs, a questionnaire survey was made of the 1955 and 1956 classes. Returns from 82% of the 1380 officers still in service and 62% of the 387 who had left it provided information about training, career experience, and attitude toward the Air Force. Responses showed that those apt to remain in service were older, married, regular officers. Younger officers who were ROTC graduates assigned to engineering and scientific fields were likely to leave the service. Most frequent reasons given for leaving the Air Force were: promotions not based on merit; better civilian job opportunities; low pay; and unsettled family life. In-service officers' reasons for remaining were retirement advantages and amount of time already invested. They might decide to leave for a high-paying civilian job, loss of flight pay, or missing out on promotion. Nonmonetary aspects of the work situation were important determiners of job satisfaction. A Retention Potential Score, using information available before AFIT assignment, applied as a screening device would appreciably increase the retention of AFIT graduates. (Author)

AD-403 831 Div. 23, 28
(TISTB/AW) OTS price $3.60

6570th Personnel Research Lab., Aerospace Medical Div., Lackland Air Force Base, Tex.
SURVEY OF TESTS USED IN AIRMAN CLASSIFICATION,
by William B. Lecznar. Feb 63, 31p.
Proj. 7717, Task 771705
PRL TDR63 5
Unclassified report

Descriptors: *Military personnel, *Aptitude tests, Classification, History, Recruiting, Aviation personnel, Selection, Air Force.

Aptitude tests have been used since 1948 to aid in selecting and assigning enlistees to the training for which they are best suited by ability and education. By this means the Air Force seeks to reduce the cost of training and realize competent, well-satisfied career airmen. This survey traces the history of airman aptitude testing, tells how effective tests are identified, how the tests are assembled, and how the scores are used. The present Airman Qualifying Examination is described and compared with other aptitude test batteries. The role of research in seeking out more effective techniques of personnel selection and assignment is emphasized, with illustrations from ongoing studies. (Author)

AD-404 086 Div. 23, 30
(TISTM/LMH) OTS price $2.50

MITRE Corp., Bedford, Mass.
PROGRAMMED INSTRUCTION. A SELECTED BIBLIOGRAPHY.
by C. S. Morrill, D. T. Halpert, and S. H. Pilsucki. Apr 63, 111p. SR69 1
Contract AF33 600 39852, Proj. 702
ESD TDR62 225
Unclassified report

Descriptors: *Education, *Programming computers, *Bibliographies, Automation, Training devices, Documentation, Teaching machines, Reading, Instructors.

AD-404 187 Div. 23
(TISTB/AW) OTS price $1.60

6570th Personnel Research Lab., Aerospace Medical Div., Lackland Air Force Base, Tex.
RELATIONSHIPS BETWEEN ATTENDANCE AT SQUADRON OFFICER SCHOOL AND LATER OFFICER EFFECTIVENESS REPORTS.
by Ernest C. Tupes. Apr 63, 13p.
Proj. 7719, Task 771904
PRL TDR63 10
Unclassified report

Descriptors: *Officer personnel, Statistical analysis, Correlation techniques, Military training, Effectiveness.

Two questions of interest to the staff of the Air Force Squadron Officer School were investigated. The first question asked whether attendance at Squadron Officer School resulted in an increase in officer effectiveness, and the second asked whether those officers who achieved the higher grades in Squadron Officer School were more effective in their subsequent career than officers achieving lower grades. The criteria of effectiveness were Officer Effectiveness Reports (OERs) completed on each officer in the 2 years immediately following Squadron Officer School. Results of a series of multiple regression analyses indicated that, when other factors associated with OERs were taken into consideration, no differences were found which could be attributed to either attendance or nonattendance at Squadron Officer School, nor to performance during Squadron Officer School. An appendix presents a nontechnical discussion of the method of multiple linear regression. (Author)

AD-404 464 Div. 23
(TISTB/AW) OTS price $8.10

Office of Naval Research, Washington, D. C.
TRI-SERVICE CONFERENCE ON NEW APPROACHES TO PERSONNEL-SYSTEMS RESEARCH, WASHINGTON, D. C. MAY 23, 24, 1962.
1962, 80p. ACR 76
Unclassified report

Descriptors: *Job analysis, *Military personnel, Military training, Officer personnel, Selection, Operations research, Symposia, Classification.

Contents:
The New Classification System of the United States Employment Service
Air Force Personnel-Systems Research
Army Personnel-Systems Research
Navy Personnel-Systems Research Program
Procedural and Mechanization Research to Support Personnel-Systems Design
The Warrant Officer and the Technician-Level Job
Some Contributions of Training Research to the Personnel-Systems Concept
Interaction of Personnel Subsystems--An Operations Research Approach
A Modified Approach to Training Requirements Research to Improve Mobilization Readiness
USAF Occupational Research Projects of Tri-Service Interest

AD-404 599 Div. 23
(TISTM/LMH) OTS price $3.60

Psychological Research Associates Inc., Arlington, Va.
THE DEVELOPMENT OF JOB PROFICIENCY TESTS FOR SELECTED OPERATOR POSITIONS IN THE WEAPONS BRANCH.
June 60, 21p. P T27;60 32
Contract AF19 604 5616
Unclassified report

Descriptors: *Job analysis, Human engineering, Test construction (Psychology), Maintenance personnel, Protective techniques, Performance tests, Analysis of variance, Factor analysis, Aptitude tests, Test methods.

The research reported was concerned with the development of paper-and-pencil job knowledge tests for six positions in the Weapons Branch of a Direction Center in the SAGE System. Three tests were developed, the positions being paired as follows: Senior Director/Senior Director Technician (SD/SDT); Weapons Director/Weapons Director Technician (WD/WDT); Intercept Director/Intercept Director Technician (IND/INT). The report treats the job description techniques, rationale for test outline, item development, preliminary tryout in the New York Air Defense Sector (NYADS), item analysis and test revision, final administration at the Boston and Syracuse Air Defense Sectors (BOADS and SYADS), and at the training facility at Richards-Gebaur Air Force Base (RG). Also included are information on test reliability and validity, and recommendations for normative use of the tests. (Author)

AD-404 655 Div. 23
(TISTB/AW) OTS price $14.50

Psychological Research Associates, Inc., Arlington, Va.
TEXTBOOK.
1961, 1v. 61 4
Contract AF19 604 5616, Proj. 1975, Task 76892
AFCCDD TN61 26 V1 Unclassified report

Descriptors: *Training, *Maintenance, *Instruction manuals, Air Defense Command, Data processing systems, Maintenance personnel, Data transmission systems.

24. PHOTOGRAPHY AND OTHER REPRODUCTION PROCESSES

No Entries

25. PHYSICS

AD-403 500 Div. 25
(TISTP/WH) OTS price $5.60

Recon, Inc., Tallahassee, Fla.
STRESS WAVE PROPAGATION IN LAYERED ELASTIC CYLINDERS,
by Grover L. Rogers and James W. Shiver. Aug 62, 1v. TR10
Grant DA22 079CIVENG62 8
Unclassified report

Descriptors: *Rods, *Mechanical waves, *Wave transmission, *Integral transforms, Stresses, Propagation, Laminates.

The multi-layered cylinder made of elastic materials and subjected to an arbitrary end excitation is solved using the classical wave method, the Laplace transform method, and the transmissibility method. Complete numerical solutions are presented for a pressure pulse having a rapid rise and an exponential decay. Curves for displacements, stresses, and accelerations at various sections of bars of varying geometries are presented. (Author)

AD-403 527 Div. 25
(TISTM/MFA) OTS price $1.60

Rome Air Development Center, Griffiss Air Force Base, N. Y.
CERENKOV RADIATION AND ITS APPLICATION TO MICROWAVE GENERATION,
by Robert J. Kenyon. Dec 62, 10p.
Proj. 4519, Task 451904
RADC RAU TM62 7
Unclassified report

Descriptors: *Cerenkov radiation, Microwaves, Electromagnetic fields, Electron accelerators, Electron beams, Plasma physics, Plasma oscillations, Gas discharges, Ferrites, Communication equipment, Microwave communication systems, Generators, Theory.

The Cerenkov process of microwave generation is presently being explored as a technique for establishing a high efficiency, high power r-f device operable in the 2 to 10 kmc region of the electromagnetic spectrum. In this report the basic theory is presented along with an examination of what progress has been made for future research which might lead to the realization of such a device. (Author)

AD-403 530 Div. 25
(TISTP/MFA) OTS price $3.60

Keele U. (Gt. Brit.).
RESEARCH IN MOLECULAR QUANTUM THEORY.
Final technical rept. 1 Nov 61-31 Oct 62.
30 Nov 62, 30p.
Contract DA91 591EUC2034
Unclassified report

Descriptors: *Molecular structure, Hyperfine structure, Atomic structure, Beryllium, Nuclear spins, Electrons, Organic compounds, Field theory.

AD-403 533 Div. 25, 15
(TISTP/MFA) OTS price $4.60

Observatoire, De Paris-Meudon (France).
UNDAMPED WAVES IN A COLLISION FREE ELECTRON PLASMA,
by Donald Mc Lean. 10 July 62, 26p. TN3.
Contract AF61 052 432, 1v.
AFCRL 63 259
Unclassified report

Descriptors: *Plasma physics, *Plasma oscillations, Equations, Wave transmission, Propagation, Statistical functions, Partial differential equations, Distribution theory, Electron density, Theory, Damping.

AD-403 541 Div. 25
(TISTP/WH) OTS price $5.60

Tennessee U., Knoxville.
INFRARED SPECTRUM OF HYDROGEN FLUORIDE: SHAPES, POSITIONS AND INTENSITIES OF HIGH J LINES IN THE FUNDAMENTAL BAND,
by Lester F. Eldreth. Dec 62, 49p. SR3
Contract AF19 604 7981, Proj. 7670, Task 767002
AFCRL 62 1090
Unclassified report

Thesis.

Descriptors: *Line spectrum, *Absorption spectrum, *Infrared spectroscopy, Hydrogen compounds, Fluorides, Diatomic molecules, Spectra (Infrared), Pressure.

The aim of this investigation was to determine experimentally the true line shape and line position for as many as possible of the high J rotational absorption lines in the hydrogen fluoride fundamental band. The line shapes were to be determined at identical temperatures and at pressures where pressure broadening made the only significant contribution to the line shape. All data were taken on the high resolution vacuum-grating spectrometer. The HF lines were used as internal standards for calibrating purposes. The R(5) line of the first overtone of CO was used to determine the slit function to correct measured line shapes for distortions caused by instrumental broadening. The line position of R(11) was measured to be 4320.97 waves per cm. The line shapes of R(9), R(10), and R(11) were determined and found to be truly Lorentzian. (Author)

AD-403 642 Div. 25
(TISTM/AW) OTS price $6.60

Louisiana State U., Baton Rouge.
ELECTRON TRANSPORT PHENOMENA IN BISMUTH AT LIQUID HELIUM TEMPERATURES, PART I,
by C. G. Grenier, J. M. Reynolds, and J. R. Sybert. Mar 63, 56p. IR4
Grant DA ORD31 124 61 G76, DA Proj. 59901004
AROD 157912
Unclassified report

Descriptors: *Bismuth, *Single crystals, *Solid state physics, Transport properties, Thermal conductivity, Resistance (Electrical), Oscillation, Electrical properties, Molecular structure, Low temperature research, Thermoelectricity, Magnetic properties, Hall effect, Crystal lattices.

Transport effects were studied in a bismuth single crystal at liquid helium temperatures in a magnetic field. The thermal conductivity was found to be almost entirely due to lattice conductivity; therefore, the experimental coefficients determined were limited to the following: the isothermal transverse magnetoresistivity, the isothermal Hall resistivity, the (adiabatic)

thermoelectric coefficient, the (adiabatic) Nernst-Ettinghausen coefficient, and the transverse magnetothermal resistivity. The Peltier tensor coefficients were expected (from the Onsager relations) to be too small to be measureable and thus, were not studied here. All these effects, except the thermal resistivity coefficient, exhibit Schubnikov-de Haas type oscillations. The kinetic coefficients of certain transport effects were computed from the experimental coefficients and compared with available theories. A rough analysis of the gross effects was made by a decomposition of each coefficient into a sum of different band contributions, each band being approximated by a Lorentz term. General but not complete agreement between experiment and theory is achieved for both two-band and multi-band models. (Author)

AD-403 643 Div. 25
(TISTP/WH) OTS price $1.10

Syracuse U., N. Y.
QUANTUM FIELD THEORY AND ELEMENTARY PARTICLES.
Final rept., 1 Jan 60-31 Aug 62,
by A. O. Barut. 31 Aug 62, 5p.
Unclassified report

Descriptors: *Quantum mechanics, *Elementary particles, *Field theory, Nuclear resonance, Nuclear scattering, Nuclear spin.

AD-403 645 Div. 25, 4
(TISTP/MFA) OTS price $1.60

Leicester U. (Gt. Brit.).
A STUDY OF ION-ION AND ION-SOLVENT INTERACTIONS.
Annual technical rept., Jan-Dec 62,
by M. C. R. Symons. 1 Dec 62, 13p.
Contract DA91 591EUC2100
Unclassified report

Descriptors: *Ultraviolet radiation, *Halides, Organic compounds, Solvents, Ions, Molecules, Temperature, Absorption, Solutions.

The ultraviolet absorption properties of solutions of iodide ion in polar solvents has been discussed by Smith and Symons in terms of a square-well model which crudely resembles the model adopted for the description of F-centres in alkali halide crystals. In this investigation the behaviour of bromide and chloride ions in similar solvents is discussed. It is shown that the ultraviolet absorption properties of bromide ion in water and methyl cyanide and chloride ion in methyl cyanide bear a striking resemblance to the behaviour of iodide ion in these systems. In addition, the tail of the absorption band of bromide ion in other polar solvents, e.g. alcohols, ethyl cyanide etc., also exhibits a similar parallelism in behaviour with the iodide ion and this conclusion is confirmed by observations of the behaviour of the absorption spectra in mixed solvent systems. The similarity in the temperature dependence of the position of the first absorption band for iodide, bromide and chloride in methyl cyanide is noted although the contributing factors which are responsible for this apparent independence of the size of the central ion remain a matter for speculation. (Author)

AD-403 656 Div. 25
(TISTP/WH) OTS price $10.50

Ford Instrument Co., Long Island City, N. Y.
LO-TEMP THERMIONIC PLASMA STUDY.
Final rept.,
by Wolfram Stengel. 31 Jan 63, 1v.
Contract Nonr3416 00, Proj. NR099 356
Unclassified report

Descriptors: *Thermionic emission, *Energy conversion, *Plasma physics, Cesium, Oxygen, Tungsten, Electric discharges, Gas discharges.

Measurements of electron temperature, electron concentration and space potential in the plasma region of low temperature thermionic converters were determined by means of a pulsed Langmuir probe technique. The spatial distributions of these parameters, in parallel plate geometry, were measured with the aid of movable probes within these operating converters. The experimental values are shown to be consistant with reasonable physical models. Spectroscopic measurements were made in both the visible and infrared regions and the validity and applicability of the results are discussed. Results obtained from converters, in which small amounts of oxygen were present in the discharge region, are explored. The effects of cesium and ''patch effects'' on the surface characteristics of impregnated tungsten emitters are discussed on the basis of a theoretical analysis and experimental results with numerous test cells. (Author)

AD-403 657 Div. 25
(TISTM/AW) OTS price $4.60

Laboratory for Insulation Research, Mass. Inst. of Tech., Cambridge.
TEMPERATURE AND RISE-TIME DEPENDENCE OF THE ELECTRIC STRENGTH OF ALKALI HALIDE CRYSTALS,
by Francis W. Kaseta. Mar 63, 39p. TR177
Contract Nonr184110, Proj. NR018 801
Unclassified report

Descriptors: *Halides, *Single crystals, Temperature, Low temperature research, Ionization, Crystal lattices, Crystals, Electrons, Alkali metals, Dielectric properties.

Techniques were developed to extend d-c and impulse breakdown measurements to liquid-helium temperature. The breakdown strength of KCl was measured from 4.2 to 425 K with d-c voltages and 1- and 10-microsec rise-time pulses. The temperature characteristic of the d-c electric strength reached a maximum of 1.16 Mv/cm at about 360 K and then dropped to 1.04 Mv/cm at 425 K. The breakdown strength was lower for d-c voltages than for pulses over the entire temperature range. For 1-microsec rise-time pulses, the maximum of the d-c temperature characteristic disappeared. Below 77 K, the breakdown strength measured with pulse and d-c voltages did not change appreciably. Changing the pulse rise time from one to ten microsec had little effect on electric strength. No thickness dependence was observed. The electric strength of a mixed crystal (75% KCl - 25% RbCl) was measured from 77 to 375 K. The temperature characteristic differed in shape from that of pure KCl; the slope at low temperatures was smaller and the maximum shifted to about 300 K. At 375 K, the breakdown strength of the mixed crystal had dropped to 0.60 Mv/cm. (Author)

AD-403 661 Div. 25
(TISTP/MFA) OTS price $3.60

Duke U., Durham, N. C.
THE SPIN WAVE SPECTRA OF YTTRIUM- AND GADOLINIUM-IRON GARNET.
Technical rept. no. 2,
by A. Brooks Harris. 1 May 63, 37p. TR2
Contract Nonr118112, Proj. NR018 904
Unclassified report

Descriptors: *Magnetic properties, *Garnet, Brillouin zones, Yttrium, Iron, Motion, Equations, Symmetry (Crystallography), Anisotropy, Transformations (Mathematics), Magnetic moments, Magnetic fields, Specific heat, Crystal lattices, Simultaneous equations, Matrix algebra, Nuclear spins, Low-temperature research, Gadolinium, Measurement, Crystal structure.

The problem of deducing the values of the exchange integrals in yttrium- and gadolinium-iron garnet from measurements of the magnetization and the magnetic contribution to the specific heat at low temperatures is considered. For these garnets the spin wave normal modes can be found by solving the semi-classical equations of motion which give rise to a set of n simultaneous linear equations, where n is the number of magnetically inequivalent ions in the unit cell. Expressions for the thermodynamic functions at low temperatures in terms of the frequencies of the normal modes are given assuming the validity of the spin wave approximation. It is argued that the temperature variation of the frequency of these normal modes on the macroscopic properties can be completely accounted for without considering the zero point energy explicitly. Due to the size of the unit cell, the equations for the frequencies of the normal modes can only be solved numerically for general values of k. Such solutions are obtained for k lying along a (111) direction for various values of the exchange integrals, and the thermodynamic functions corresponding to these choices of parameters are calculated. (Author)

AD-403 668 Div. 25
(TISTP/MH) OTS price $1.10

Sacramento Peak Observatory, Sunspot, N. Mex.
AN ATTEMPT TO PHOTOGRAPH PROMINENCES IN THE INFRARED LINE OF HELIUM LAMBDA 10830,
by G. S. Ivanov-Kholodny, Tr. by A. B. Dunn. 1963, 4p. SRN25
AFCRL 63 267

Unclassified report

Trans. from Krim. Ast. Obs. 8:115, 1952.

Descriptors: *Solar atmosphere, Helium, Infrared spectroscopy, Filters, Hydrogen, Solar spectrum, Solar radiation.

In the article is given a description of an attempt to photograph prominences in the infrared line of helium lambda 10830 both by means of a spectrograph and by means of an interference-polarization filter. Shown here are preliminary results of a comparison of emission of prominences in line lambda 10830 with emission in lines of helium D-3 and alpha of hydrogen. (Author)

AD-403 678 Div. 25
(TISTP/MH) OTS price $1.60

Sacramento Peak Observatory, Sunspot, N. Mex.
ON THE ENERGY BALANCE AND STRUCTURE OF THE CHROMOSPHERE,
by E. E.Dubov, tr. by A. B. Dunn. 1963, 17p. RN23
AFCRL 63 265

Unclassified report

Trans. from Izvestia Krimskoi Ast. Obs., vol. 22, pp. 101-117, 1960.

Descriptors: *Solar atmosphere, Thermal radiation, Shock waves, Heating, Heat transfer, Solar radiation, Thermal conductivity, Noise (Acoustic).

The conception of the heating of the chromosphere by compressional waves, originating in regions of turbulence connected with the convective zone of the Sun, is developed. It is shown that in the chromosphere a balance can be reached between the energy, produced as a result of the dissipation of shock waves, and the energy carried away by radiation. The shock waves provide for the appearance in the chromosphere of regions with different temperatures (a two-temperature chromosphere). (Author)

AD-403 679 Div. 25
(TISTP/MH) OTS price $1.60

Sacramento Peak Observatory, Sunspot, N. Mex.
THE MOTION OF SPOTS CONNECTED WITH SOLAR FLARES AND THE POSSIBLE CHARACTER OF ENERGY EXIT FROM FLARE REGIONS,
by S. I. Gopasyuk, tr. by A. B. Dunn. 1963, 7p. RN24
AFCRL 63 266

Unclassified report

Trans. from Izvestia Krimskoi Ast. Obs., 27:110-119, 1962.

Descriptors: *Sunspots, *Solar flares, Solar radiation, Astronomical observatories, Solar atmosphere, Magnetic fields, Motion, Solar disturbances.

Photographs of the sun in integrated light were obtained during flares observed in Hydrogen-alpha with the AFP-2 and the solar tower telescope, the focus being equal to 12 meters. It is found that: (1) with the appearance and development of flares, a shift of the sunspots is observed in the direction to the flare knots; (2) the commencement of flare development and that of spot motion coincide with a precision of ±5 minutes; and (3) the spot motion continues for 2 to 3 hours after the termination of the flare in H-alpha and is probably of a pulsational-translational character. The amplitude of pulsation increases with the importance of the flare. (Author)

AD-403 680 Div. 25
(TISTP/MH) OTS price $3.60

Sacramento Peak Observatory, Sunspot, N. Mex.
THE DEVIATION OF PROFILES OF EMISSION LINES OF PROMINENCES FROM A DOPPLER PROFILE,
by G. S. Ivanov-Kholodny, tr. by A. B. Dunn. 1963, 29p. SRN26
AFCRL 63 268

Unclassified report

Trans. from Izvestia Krimskoi Ast. Obs., 18:109-135, 1958.

Descriptors: *Solar spectrum, Solar radiation, Emissivity, Photometers, Spectrum analyzers, Absorption spectrum, Hydrogen, Helium, Doppler effect.

The profiles of the emission lines in four prominences were measured. Special attention was paid to the photometric procedure, the accuracy of intensity measurements is 1-2%. The astigmatism of the spectrograph and the asymmetry of the instrumental profile were determined. The graphical method was used for obtaining more precise data about the profiles. Some of the observed profiles have the form of a Gaussian curve in the core of the line, but deviate appreciably from it in the wings. Some other profiles deviate from the Gaussian curve in the center of the line, because of self-absorption. For most of the profiles the halfwidths were determined with an accuracy of 1-3%. (Author)

AD-403 710 Div. 25, 2
(TISTP/WH) OTS price $6.10

Army Engineer Geodesy, Intelligence and Mapping Research and Development Agency, Fort Belvoir, Va.
FORMULAS FOR COMPUTING ATMOSPHERIC REFRACTION FOR OBJECTS INSIDE OR OUTSIDE THE ATMOSPHERE,
by Angel A. Baldini. 9 Jan 63, 56p.
GIMRADA RN8
Unclassified report

Descriptors: *Refraction, *Light, Refractive index, Equations, Integral equations, Geodesics, Mapping, Atmosphere.

This report presents the derivation of new equations for determining the changes in the direction of a ray of light as it passes through the atmosphere from an object to the observer. The equations are applicable to objects inside or outside the atmosphere. Equations are also derived for obtaining the topocentric distance of the object as a function of the object's height and the observed zenith distance. (Author)

AD-403 713 Div. 25, 27, 30
(TISTA/LSK) OTS price $2.50

Boeing Co., Seattle, Wash.
STUDIES OF ROCKET NOISE SIMULATION WITH SUBSTITUTE GAS JETS AND THE EFFECT OF VEHICLE MOTION ON JET NOISE.
Final rept.,
by Walter V. Morgan and Kenneth J. Young.
Mar 63, 93p.
Contract AF33 616 8201, Proj. 1370, Task 137005
ASD TDR62-787 Unclassified report

Report on Dynamic Problems in Flight Vehicles.

Descriptors: *Rocket motor noise, Helium, Jets, Acoustics, Vibration, Resonance, Exhaust gas, Measurement, Motion, Velocity, Simulation, Model tests.

The feasibility of using helium jets as a practical substitute for actual rockets in scale model acoustic tests was investigated by conducting an experimental program with four heated helium models. Sufficient evidence is presented to indicate that the substitute gas modeling concept is valid, i.e., simulation of rocket noise can be achieved if the essential rocket flow parameters are duplicated. It is not possible to duplicate all flow parameters simultaneously and retain the essential feature of simplicity; compromises must be made. The helium model performed best. This evaluation is based on agreement in sound pressure levels with a small solid propellant rocket. An investigation was made to determine the effect of flight vehicle motion on propulsion system noise propagated to parts of the vehicle located in the near field. Experiments were performed using a 0.6-in. diameter heated air jet operating in a 16-in. diameter acoustically-treated wind tunnel. Experimental results compare favorably with predictions based on the hypothesis which explains the effect of vehicle motion by two separate factors: the noise produced by a jet in motion depends on the relative velocity between the jet and the air through which it moves; and a shifting of the noise radiation pattern toward the rear occurs because of combined effects of vehicle motion and the finite velocity of sound. (Author)

AD-403 765 Div. 25
(TISTP/MH) OTS price $10.10

Durham U. (Gt. Brit.).
VARIATIONS OF THE SEA LEVEL MUON FLUX.
Technical rept.,
by F. Ashton, J. B. M. Pattison, and A. W. Wolfendale. 20 Jan 63, 116p.
AFCRL 63 401
Unclassified report

Descriptors: *Muons, Cosmic rays, Spectroscopy, Spectrum analyzers, Geiger counters, Cosmic ray telescopes, Flash lamps, Neon, Pions, Magnets.

Studies of cosmic ray muons were made with a spectrograph comprising a solid iron magnet, Geiger counters and neon flash-tubes. The characteristics of the instrument are described. Time variations in the vertical direction were studied and are attributed to variations of meteorological parameters. Momentum spectra were measured in the range 2 - 500 GeV/c for zenith angles between 77.5 and 90 degrees. The results are interpreted as showing that most muons in this range come from pions; an upper limit of 0.55 is placed on the K-to-pi ratio for proton-air nucleus collisions of 700 - 30,000 GeV. The positive-negative ratios confirm a near constant value of 1.2 over the range of muon energies 10 - 200 GeV; a likely explanation is that there is an increase in the fluctuations of multiplicity in high energy collisions. (Author)

AD-403 784 Div. 25
(TISTP/WH) OTS price $4.50

Tennessee U., Knoxville.
THE DEPENDENCE OF ETA ON LINE BREADTH OF THE SPECTRAL LINE R(4) OF HYDROGEN FLUORIDE,
by Hugo A. Hardt and N. M. Gailar. Mar 63, 38p.
SR4
Contract AF19 604 7981, Proj. 7670, Task 767002
AFCRL63 262 Unclassified report

Master's thesis.

Descriptors: *Line spectrum, *Absorption spectrum, *Infrared spectroscopy, Hydrogen compounds, Fluorides, Programming (Computers), Diatomic molecules, Spectra (Infrared), Pressure.

This analysis is a study of the variation with pressure of the true line shape of R(4) in the HF band. A modified Lorentzian line shape in which the exponent was found to be only a function of the distance from line center fitted the experimental points. (Author)

AD-403 785 Div. 25
(TISTM/AW) OTS price $7.60

General Telephone and Electronics Labs., Inc., Palo Alto, Calif.
INVESTIGATION OF THE ENERGY LEVELS OF MAGNETIC IONS IN THE COMPLEX METAL OXIDES, ESPECIALLY IN THE ORTHOFERRITES.
Final rept.,
by Robert L. White. 28 Mar 63, 56p.
Contract AF19 628 387, Proj. 5621, Task 562104
AFCRL 63 103
Unclassified report

Descriptors: *Ferrites, *Rare earths, Paramagnetic resonance, Nuclear magnetic resonance, Aluminates, Yttrium compounds, Gadolinium compounds, Crystal structure, Absorption spectrum, Resonance absorption, Oxides, Rare earth compounds, Nuclear spins.

The allowed spin configurations in the rare earth orthoferrite were derived on the basis of

group theory and correlated with those actually observed. The susceptibilities and antiferromagnetic resonance modes of YFeO3 were calculated. The paramagnetic resonance spectra of Fe3+ and Gd3+ in YAlO3 were measured and the spectra analyzed to give spin Hamiltonian parameters for these ions. The Fe3+ site was found to be nearly cubic, but the Gd3+ site was badly distorted. The spin Hamiltonian parameters were compared with crystal fields calculated on a point ion model using positional parameters measured not for YAlO3 but for GdFeO3. Poor agreement was found. Further evidence that the crystal fields are substantially different in the ortho-aluminates from the orthoferrites were obtained in the optical spectrum of Yb3+ in YAlO3 and YbFeO3. The Fe3+ - Yb3+ exchange was observed in the optical spectrum of Yb3+ in YbFeO3. The exchange splittings were large, 6 to 10 reciprocal cm, although the Yb3+ and Fe3+ spins are at nearly right angles, indicating a large antisymmetric exchange. Further studies are suggested to illuminate the orthoferrite magnetic structure. (Author)

AD-403 786 Div. 25
(TISTP/MH) OTS price $3.60

Laboratoire D'Infra Rouge Technique et Applique (France).
STUDY OF THE RADIATIVE RECOMBINATION OF FREE CARRIERS PRODUCED BY ELECTRON BOMBARDMENT OF CADMIUM SULFIDE,
by Gilles de Gaalon. 1962, 29p.
Contract N62558 2720
Unclassified report

Descriptors: *Electron bombardment, *Luminescence, Sulfides, Semiconductors, Solid state physics, Excitation, Impurities, Ionization, Cryogenics, Calcium compounds.

AD-403 797 Div. 25, 15
(TISTP/MFA) OTS price $4.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
DIFFRACTION PATTERN ANALYSIS OF A RECTANGULAR APERTURE IN THE PRESENCE OF ABERRATIONS. PART I. DERIVATION OF A GENERAL SOLUTION,
by Hermann P. Greinel. Feb 63, 1v. 6 90 62 116
Unclassified report

Technical report on Communications.

Descriptors: *Diffraction, *Optical properties, Distortion, Wave transmission, Polynomials, Integral equations, Optical equipment, Optical analysis, Analysis, Electromagnetic waves.

A general solution of the diffraction integral for a rectangular aperture considered in scanning procedures of diffraction patterns is discussed. It is shown that in the presence of aberrations, the integrand in Fresnel-Kirchhoff's diffraction formula can be expanded into a series. By this expansion, the two-dimensilnal diffraction integral is converted into a summation, the single terms of which divide into products of two functions where only one-dimensional integrations over products of Legendre polynomials are to be performed. In these integrations, use is made of the orthogonality property of Legendre's polynomials. Particular solutions are obtained concerning the two-dimensional diffraction pattern intensity distribution in the Gaussian image plane for an aberrant optical system and the three-dimensional intensity distribution near the focus of an aberration-free optical system. (Author)

AD-403 801 Div. 25
(TISTM/PCR) OTS price $4.60

Northwestern Technological Inst., Evanston, Ill.
SOME CRYSTALLOGRAPHIC TECHNIQUES FOR THE STUDY OF MECHANICAL TWINNING AND THEIR APPLICATION TO SHOCK-INDUCED TWINNING IN COPPER,
by R. J. DeAngelis and J. B. Cohen. Apr 63, 1v. TR3
Contract Nonr1228 20, Proj. 031 680
Unclassified report

Presented at A.I.M.E. - I.M.D Conference on Deformation Twinning, March 21, 22, 1963, at College of Engineering University of Florida, Gainesville, Florida.

Descriptors: *Crystals, *Crystal structure, X-ray diffraction analysis, Electron diffraction analysis, Deformation, Shock waves, Pressure, Mathematical analysis, Microphotography, Crystal lattices, Production, Copper.

Contents:
Experimental methods for detecting twins
Determination of the twinning process
Uses to known twinning elements
Operative twin systems during deformation
Prediction of the twin reflections for a given twinning system
Quantitive estimates of amount of twinning

AD-403 802 Div. 25, 20
(TISTP/MH) OTS price $9.10

Ballistic Research Labs., Aberdeen Proving Ground, Md.
NEUTRON REFLECTION AND FLUX VERSUS DEPTH FOR CONCRETE,
by Frank J. Allen, Arnold Futterer, and William Wright. Jan 63, 115p.
Proj. 1A022601A086
BRL 1189 Unclassified report

Descriptors: *Neutron cross sections, Neutron flux, Neutrons, Reflection, Neutron absorption, Distribution, Energy, Transport properties, Concrete.

Detailed calculated results on neutron reflection and flux versus depth for concrete are given in the form of machine printouts. The angular and energy distributions of the reflected neutrons along with the energy-dependent and total flux at various depths are contained in tabular form on the printouts. Neutron number current, number flux and dose transmission are functions of thickness are also given in tabular form on the printouts. A table of summary information on reflection is presented. This contains number current, number flux, dose and energy reflection factors as functions of incident energy and angle. A few figures are presented to illustrate graphically the meaning of the various tabular results. (Author)

AD-403 814 Div. 25, 22
(TISTP/JW) OTS price $19.75

Office of the Secretary of Defense, Research and Engineering, Washington, D. C.
SHOCK, VIBRATION AND ASSOCIATED ENVIRONMENTS. PART II.
Mar 63, 1v.
OSD B31
Unclassified report

The 31st Symposium on Shock, Vibration and

Associated Environments was held in Phoenix, Arizona, 1-4 Oct 62.

Descriptors: *Shock (Mechanics), *Vibration, Climatology, Symposia, Test methods, Design, Measurement, Environmental tests.

AD-403 863 Div. 25
(TISTP/MH) OTS price $1.10

Aerospace Information Div., Washington, D. C.
INTRAMOLECULAR ENERGY TRANSFER AND LASERS.
6 May 63, 3p.
AID T63 57
Unclassified report

Trans. from Zhurnal eksperimental'noy i teoreticheskoy fiziki, 43:6, pp. 2313-2315, 1962.

Descriptors: *Lasers, Rare earths, Europium compounds, Rare earth compounds, Rare earth elements, Samarium, Samarium compounds, Ruby, Luminescence, Ions.

AD-403 871 Div. 25, 8
(TISTE/CAM) OTS price $3.60

Microwave Associates, Inc., Burlington, Mass.
INVESTIGATION OF HIGH POWER GASEOUS ELECTRONICS.
Quarterly progress rept. no. 1, 15 Nov 62-15 Feb 63,
by Harold S. Maddix. 15 Feb 63, 27p.
Contract DA36 039AMC00097
Unclassified report

Descriptors: *Quartz, *Microwaves, *Gas discharge, *Surface properties, Power, Plasma physics, Analysis, Argon, Krypton, Ion bombardment, Ionization gages, Superhigh frequency, Diffusion, Waveguides, Electric bridges, Vacuum apparatus, Helium group gases.

Cleanup and thermal recovery of inert gases at the interface between a high power microwave gas discharge and a quartz surface have been investigated. Comparable cleanup and recovery characteristics were observed for argon and krypton gases. Both the total number of atoms sorbed while the discharge was on and thermally desorbed when the discharge was terminated were proportional to the square root of time. Analysis of the data indicates that cleanup and recovery are controlled by activated diffusion processes. (Author)

AD-403 877 Div. 25
(TISTM/ODN) OTS price $6.60

Polytechnic Inst. of Brooklyn, N. Y.
THE ANOMALOUS SCATTERING OF X-RAYS BY BORON PHOSPHIDE AND ZINC SULFIDE,
by Z. Barnea and B. Post. Mar 63, 57p. TR7
Contract Nonr83912, Proj. NR032 414
Unclassified report

Descriptors: *Boron compounds, *Zinc compounds, *X rays, Crystals, Chromium, Refractive index, Copper, Intensity, Theory, X-ray spectrum, Molybdenum, Experimental data, Phosphides, Sulfides, Scattering.

The dispersion of the atomic scattering factors of Zn, S, and P in selected regions of the x-ray spectrum was investigated by measuring the differences in the intensities of Bragg reflections due to the anomalous scattering of x-rays by zinc sulfide and boron phosphide. Intensity differences among selected reflections occurring at identical Bragg angles, divided by the corresponding average intensities were plotted as functions of sin theta (the Bragg angle) and compared with 2 sets of theoretically predicted values of delta I/I sub average. Experimentally determined values of delta I/I sub average for zinc sulfide using Mo K sub alpha radiation were in good agreement with those from similar previous investigations and appear generally to be higher than the theoretically expected values, especially in the region of large Bragg angles. Similar disagreement between the calculated and experimentally observed values of delta I/I sub average was found for ZnS with copper K sub alpha radiation. Results indicate a need for revision of the dispersion corrections of Zn and S for Mo K sub alpha radiation, and also for Cu. (Author)

AD-403 884 Div. 25
(TISTP/FEM) OTS price $2.60

Brandeis U., Waltham, Mass.
CONTINUOUS REPRESENTATIONS IN THE STATISTICAL THEORY OF ELECTRONIC ENERGIES,
by Sidney Golden and George Handler. 15 Apr 63, 24p. TR7
Contract Nonr167701, Proj. NR051 362
Unclassified report

Descriptors: *Quantum mechanics, *Statistical analysis, *Continuum mechanics, Partial differential equations, Energy, Functions, Matrix algebra, Integral transforms, Numerical analysis, Bessel function, Polynomials, Spin, Particles, Density, Electrons, Theory.

The use of continuous bases of representation other than a plane-wave basis is considered in the theory developed originally by Thomas and Fermi. The bases considered here are the sets of eigen-functions of Hamiltonians corresponding to a particle subjected to a field of force which varies inversely as the cube of the distance to some fixed point. Variation of the strength of the interaction varies the basis continuously. Calculations of the energy of the hydrogen atom is carried out, with results that are appreciably closer to the quantum mechanical result than is obtained with the original Thomas-Fermi theory. Numerical results suggest the possible existence of a statistical analogue of the Rayleigh-Ritz variation principle. (Author)

AD-403 887 Div. 25, 8
(TISTP/WH) OTS price $1.10

Electrical Engineering Research Lab., U. of Texas, Austin.
RESEARCH ON ELECTROMAGNETIC WAVE PROPAGATION EFFECTS IN DYNAMIC SITUATIONS.
Quarterly engineering rept. no. 4, 1 Feb-30 Apr 63.
30 Apr 63, 4p.
Contract AF33 657 8716, Proj. 4062
Unclassified report

Descriptors: *Oxygen, *Absorption, *Extremely high frequency, Attenuation, Line spectrum, Atmosphere.

Measurement in the laboratory's 500-foot absorption cell of the intensity and shape of the 118.75 kMc/s oxygen line at gas pressures between 0.5 and 760 mm of Hg and frequencies ±0.4 kMc/s of the line center frequency were completed. The line center attenuation and line half intensity-half width are approximately 1.4 db per km and 2 Mc/s per mm of Hg, respectively, for atmospheric oxygen at a temperature of 300 K and pressures where collisional broadening predominates. (Author)

AD-403 934 Div. 25
(TISTM/AW) OTS price $1.60

David Taylor Model Basin, Washington, D. C.
NEW METHODS FOR DETERMINING THE LOSS FACTOR OF MATERIALS AND SYSTEMS,
by Fred Schloss. Apr 63, 18p.
Proj. S F013 11 01
DTMB 1702
Unclassified report

Descriptors: *Damping, *Structures, Acoustic impedance, Test methods, Measurement, Ship noise, Materials.

Two new methods, one of which uses mechanical impedance techniques, are described for measuring the loss factor of materials and systems at any arbitrary frequency in frequency range from 10 to 10,000 cps. The accuracy of these methods increases with increased damping and therefore the methods complement other methods which are most accurate for low values of damping. The apparatus and accuracies are discussed. (Author)

AD-403 988 Div. 25
(TISTP/WH) OTS price $3.60

Naval Ordnance Test Station, China Lake, Calif.
TRANSMITTANCE MEASUREMENTS OF OPTICAL MATERIALS AS AFFECTED BY WEDGE ANGLE AND REFRACTIVE INDEX IN THE 2- TO 15-MICRON RANGE,
by K. B. LaBaw, A. L. Olsen and L. W. Nichols.
Apr 63, 32p.
NAVWEPS 8086, NOTS TP 3116 Unclassified report

Descriptors: *Optical materials, *Optical properties, Quartz, Arsenic compounds, Sulfides, Silicon, Germanium, Errors, Wave transmission, Refractive index, Measurement.

Error in the measurement of transmittance can be made with samples having nonparallel faces. This has been investigated because of the extensive use of transmittance as a tool for determining properties of semitransparent materials. Specimens of fuzed quartz, arsenic trisulfide, silicon, and germanium, representing a range of refractive indices, were fabricated to provide 0-, 1-, 2-, 5-, and 10-milliradian wedges across 1-inch diameter disks. Transmittance measurements were taken in the 2- to 15-micron range with Perkin-Elmer Models 21 and 221 spectrophotometers, and at 2 microns with a Cary Model 14 spectrophotometer, and correlated with refractive index and wedge angle. For materials with a low refractive index, such as fused quartz, the error introduced even by the 10-mil wedge was negligible. However, for high index materials, such as germanium, as much as 60% error was introduced by the 10-mil wedge. (Author)

AD-404 019 Div. 25
(TISTP/JW) OTS price $6.60

Polytechnic Inst. of Brooklyn, N. Y.
CIRCULAR CYLINDRICAL SHELLS UNDER SEGMENTAL CIRCUMFERENTIAL LINE LOAD,
by James Sheng and Joseph Kempner. Apr 63, 60p.
663
Contract Nonr839 17, Proj. NR064 427
Unclassified report

Descriptors: *Stresses, *Cylindrical bodies, Equations, Load distribution, Differential equations, Structural shells, Deflection.

Equations for the deflections of and the stresses in thin-walled circular cylindrical shells simply supported at their ends and under segmental circumferential line-loads are determined. These loads consist of a uniformly distributed segmental radial load yielding a resultant radial force at the midpoint of a generator, a piecewise, uniformly distributed radial load statically equivalent to a concentrated circumferential moment at the midpoint of a generator, and a uniformly distributed longitudinal moment statically equivalent to a concentrated axial moment applied at the midpoint of a generator. Practical applications are indicated for solutions of problems involving loadings other than those specifically treated. Explicit expressions are given for the deflections, membrane, and bending stresses for the radial load case. A technique involving the consideration of residuals is used. Comparison of the solutions of this radial line-load case with those corresponding to a line-load along a segment of a generator of a corresponding cylinder is made. The numerical results, show that the present solutions are adequate for the direct estimation of deflections and membrane stresses due to localized surface loads. (Author)

AD-404 024 Div. 25
(TISTM/AW) OTS price $1.60

Ordnance Materials Research Office, Watertown, Mass.
AN EXPERIMENTAL DETERMINATION OF THE EFFECT OF POWDER SAMPLE POROSITY ON X-RAY INTEGRATED INTENSITIES,
by J. J. DeMarco and R. J. Weiss. Jan 63, 11p.
DA Proj. 593 32 007
MRL R114
Unclassified report

Descriptors: *Porosity, *X-ray diffraction analysis, Errors, Powders, Statistical distributions.

Measurements are presented which support a simple derivation for the effect of porosity on the integrated intensity of Bragg peaks in powders. A practical method of correcting for porosity is presented which makes use of fluorescent radiation from the sample. (Author)

AD-404 027 Div. 25, 4
(TISTM/TCG) OTS price $2.60

Royal Coll. of Science and Technology, Glasgow (Gt. Brit.).
INORGANIC AND ORGANIC ONIUM SALTS,
by D. W. A. Sharp, J. Thorley, and Ali Mohammed.
31 Oct 62, 23p.
Contract DA91 591EUC1965
Unclassified report

Descriptors: *Nitrogen compounds, *Inorganic compounds, *Spectra (Infrared), *Organic compounds, Complex compounds, Absorption, Organic solvents, X-ray photography, Dyes, Chemical equilibrium, Metalorganic compounds, Metals, Chlorides, Fluorides, Synthesis (Chemistry), Oxides, Crystal lattices, Ions, Monoxides, Organic compounds, others.

The nitrosonium NO+ ion absorbs in the infrared between 1/2400 and 1/2150 cm. Salts of complex fluoro-acids absorb at higher frequencies than salts of complex chloro-acids. NO and N2O4 react with beta-group metal halides to give solid adducts. Infrared spectroscopic examination has shown that metal halide adducts generally contain nitrosonium ions. Hexaphenylditin does not undergo marked heterolytic dissociation

in nitromethane solution. Triphenyltin fluoroborate can be prepared from solution in organic solvents but much solvent is always carried down with the compound. New salts containing the triphenylmethyl carbonium ion and the SiF6(2-) and TiF6(2-) anions have been prepared and this cation has been identified in the substance Ph3C(+)Br5(-). Organometallic derivatives containing unsaturated linkages appear to be readily protonated in solution in acid. The factors influencing the covalent-ionic equilibrium are discussed. (Author)

AD-404 042 Div. 25
(TISTM/PCR) OTS price $1.10

Weizmann Inst. (Israel).
THE STRENGTHS OF ABSORPTION LINES IN THE 2-0 BAND OF CARBON MONOXIDE,
by U. P. Oppenheim and Hanna Goldring. Dec 62, 5p. TSN4
Contract AF61 052 388
AFCRL 63 283 Unclassified report

In cooperation with Technion, Israel Institute of Tech., Haifa.

Descriptors: *Carbon compounds, *Absorption spectrum, Diffraction analysis, Spectrum analyzers, Mathematical analysis, Equations, Pressure, Gases, Rotation, Vibration, Frequency, Dipole moments, Monoxides, Line spectrum.

A new determination of the strengths of absorption lines in the 2-0 band of CO was carried out. Very recently the strengths of lines in this band were reported by Kostkowski and Bass, and also briefly by Benedict et al. The present observations were made with better spectral resolution than the ones made by these workers. The spectrometer was a 5-m grating instrument used in double pass. The spectral slit width used was about 0.07/cm. The studies were made with gas at approximately atmospheric pressure, and with sample lengths varying from 1 to 30 cm. The sample temperature was 300 K. (Author)

AD-404 046 Div. 25
(TISTM/ODN) OTS price $1.10

Textile Research Inst., Princeton, N. J.
THE MODULUS OF POLYETHYLENE,
by A. V. Tobolsky and V. D. Gupta. May 63, 4p.
TR34
Contracts Nonr09000 and Nonr09001
Unclassified report

Descriptors: *Polyethylene plastics, Shear stresses, Equations, Density, Temperature, Crystallization, Elasticity.

AD-404 068 Div. 25, 30
(TISTP/JW) OTS price $1.10

Naval Ordnance Test Station, China Lake, Calif.
MODIFICATIONS AND ADDITIONS TO THE NOTS GENERAL OPTICAL RAY TRACING COMPUTER PROGRAM SUPPLEMENT,
by G. W. Shavlik. Mar 63, 6p.
NAVWEPS 7966; NOTS TP3163 Unclassified report

Suppl. to NAVWEPS rept. no. 7966, AD-290 505.

Descriptors: *Optical scanning, Programming (Computers), Optical analysis, Data processing systems.

Additional modifications to the general optical ray tracing computer program at NOTS are presented. This material is supplemental to NAVWEPS Report 7966 (NOTS TP 3011), dated September 1962. (Author)

AD-404 071 Div. 25, 6
(TISTP/JEA) OTS price $1.10

Institute of Science and Tech., U. of Michigan, Ann Arbor.
PHOTOVOLTAIC EFFECTS IN RUTILE,
by R. Keezer, J. Mudar and D. E. Brown. May 63, 7p. 2900 398R
Contracts DA36 039sc78801 and AF33 616 8410
Unclassified report

Descriptors: *Single crystals, *Ultraviolet spectroscopy, *Ultraviolet detectors, Titanium compounds, Oxides, Reduction, Time, Resistance (Electrical). Ultraviolet radiation, Sensitivity, Photons, Electrons, Absorption, Surface properties, Photoconductivity, Feasibility studies, Measurement.

The ultraviolet photovoltaic response of barrier-layer cells formed from single-crystal rutile was investigated. Typical samples have response maxima at 3200 angstroms, a detectivity D of 10 to the 9th power cm-cps 1/2/w, and time constant over several time constants of 100 micro-sec. Variations in time constant over several orders of magnitude were observed; they depend largely on preparation technique. The effect of surface treatment on cell characteristics is discussed. (Author)

AD-404 085 Div. 25
(TISTM/AW) OTS price $4.60

Du Pont de Nemours, E. I., and Co., Inc., Wilmington, Del.
THERMOELECTRIC PROPERTIES OF SELENIDES AND TELLURIDES OF GROUPS VB AND VIB METALS AND THEIR SOLID SOLUTIONS,
by W. T. Hicks and H. Valdsaar. 31 Oct 62, 27p.
Contract NObs84824, Proj. SR007 12 01, Task 802
Unclassified report

Descriptors: *Selenides, *Tellurides, *Semiconductors, Tungsten alloys, Molybdenum alloys, Hall effect, Tantalum alloys, Synthesis (Chemistry), Thermal conductivity, Thermoelectricity, Group V elements, Group VI elements, Chalcogens, Thermocouples, Rhenium, Solutions, Electrical properties, Intermetallic compounds.

The study of the tantalum-doped solid solutions of the compounds WSe2, WTe2, MoSe2 and MoTe2 was continued. To date, these complex materials showed no practical advantage over tantalum-doped tungsten diselenide. Incidental observations made in the course of this study have revealed occasional difficulties in reproducing earlier data. Hall coefficient data were obtained on several W(1-x)Ta(x)Se2 compositions at temperatures up to 600 C and were interpreted to yield information on the scattering mechanism at various doping levels and on the relation between chemical dopant concentration and carrier density. Hall effect measurements were also made on rhenium-doped molybdenum diselenide. A number of niobium and tantalum tellurides and selenides were synthesized in exploratory work. They show no promise of practical value as thermoelectric materials. Several test modules utilizing tantalum-doped tungsten diselenide were constructed; the results suggest that this p-type material may be useful in cascaded generators between 500 and 1000 C. (Author)

AD-404 154 Div. 25, 4
(TISTM/PCR) OTS price $1.60

Aerospace Information Div., Washington, D. C.
INVESTIGATION OF THE TEMPERATURE DEPENDENCE OF

THE COEFFICIENT OF DIFFUSION OF GASES.
16 May 63, 16p.
AID T63 67

Unclassified report

Descriptors: *Gases, *Diffusion, Dynamics, Combustion, High temperature research, Test methods, Equations, Mathematical analysis, Carbon dioxide, Hydrogen, Nitrogen, Viscosity, Temperature.

Two methods of determining coefficient of diffusion of gases (c. d. g.) (weight and freezing) are described. With the first, c. d. are determined for the system of gases CO2-H2, CO2-N2, N2-H2, in the range of temperatures 20 - 800 C. A semi-empirical formula of dependence of c. d. g. on temperature is offered. A connection between the coefficients of self-diffusion and interdiffusion of gases is established. A comparison is made of the formula offered and Chepmen-Enskiy's formula with the experimental data which shows a satisfactory concurrence of both formulas. (Author)

AD-404 167 Div. 25, 9
(TISTP/JW) OTS price $3.60

University of Southern Calif., Engineering Center, Los Angeles.
RADIATION FROM AN AXIALLY SLOTTED CYLINDER WITH A RADIALLY INHOMOGENEOUS PLASMA COATING,
by W. V. T. Rusch. Mar 63, 30p. EE20;82 210
Contract AF19 604 6195, Proj. 4642 Task 464202
AFCRL 63 66

Unclassified report

Descriptors: *Plasma sheath, Radiation effects, Cylindrical bodies, Dielectric properties, Antenna radiation patterns, Slot antennas, Reentry vehicles, Hypersonic flow, Electromagnetic waves.

Radiation patterns were computed for an axial slot on an infinite circular cylinder coated with a radially inhomogeneous plasma sheath. The relative dielectric constant was assumed to have three types of radial dependence: monotonic with a minimum at the inner edge of the sheath but with no portion of the sheath below plasma resonance; monotonic with the inner portion of the sheath below plasma resonance; parabolic with a minimum within the sheath and the inner portion of the sheath below resonance. The radial wave functions within the sheath are obtained in the form of infinite series. The resulting radiation patterns are found to be sharply directed in the forward direction relative to the equivalent free-space pattern. These sharply forward-directed patterns are consistent with the interpretation of a diffusion-type process within layers of the sheath below cutoff and a predominantly refraction-type process within layers above cutoff. (Author)

AD-404 168 Div. 25, 9
(TISTP/JW) OTS price $1.60

University of Southern Calif., Engineering Center, Los Angeles.
AN APPLICATION OF SOMMERFELD'S COMPLEX ORDER WAVE FUNCTIONS TO THE PROBLEM OF RADIATION FROM A DIELECTRIC COATED CONE,
by Cavour W. H. Yeh. Feb 63, 13p. EE19;82 209
Contract AF19 604 6195, Proj. 4642 Task 464202
AFCRL 63 47

Unclassified report

Descriptors: *Electromagnetic waves, Microwaves, Magnetic fields, Propagation, Functions, Electromagnetism, Dielectric properties, Conical bodies, Plasma sheath, Radiation effects.

Using the orthogonality relations of Sommerfeld's complex order wave functions, the exact solution for the problem of electromagnetic radiation from a circularly symmetric slot on the conducting surface of a dielectric coated cone is obtained. The results are valid for the near zone region as well as for the far zone region and they are applicable for arbitrary angle cones. It is noted that the technique used to solve this problem may be applied to similar type of problems involving conical structure, such as the diffraction of waves by a dielectric coated spherically tipped cone. (Author)

AD-404 170 Div. 25, 30
(TISTP/FR) OTS price $7.60

Vitro Labs., West Orange, N. J.
SOLAR RADIATION SIMULATION STUDIES, PART I,
by W. A. Jaatinen, D. L. Rothacker, R. H. Bull, M. A. Dachs, and M. R. Shenker. May 63, 68p.
2244 3 0.
Contract AF40 600 951, Proj. 7778, Task 777801
AEDC TDR63 90

Unclassified report

In cooperation with Farrand Optical Co. Inc., New York.

Descriptors: *Solar radiation, Simulation, Sources, Optical equipment components, Quartz, Sapphires, Bibliographies.

A survey of radiation sources and preliminary optical studies are described. In addition to closely approximating solar radiation in spectral characteristics, intensity, and collimation, the radiation must be uniform across the test area and throughout the test volume. The system should also be capable of extended operation. A survey and evaluation of existing and proposed radiation sources indicate that short arc lamps appear to be the most feasible source for further investigation. A hypothetical reference optical system module was designed, and curves were prepared, showing spectral distribution of transmittance of typical window materials, reflectance of mirrors, and transmittance of the module before filtering. Preliminary studies were made of energy conversion, efficiency, cooling, radiation stability of windows and lenses, and other optical system characteristics. (Author)

AD-404 173 Div. 25
(TISTM/AW) OTS price $2.60

Watervliet Arsenal, N. Y.
PRESSURE EFFECT ON VACANCY FORMATION IN GOLD,
by R. P. Huebener, and C. G. Homan. Dec 62, 27p.
DA Proj. 59925001
WVT RR6221

Unclassified report

Descriptors: *Crystal lattices, *Solid state physics, Wire, Resistance (Electrical), Volume, Quenching (Inhibition), Theory, Pressure, Gold.

Pure gold wires (99.999%) were resistance heated to 680 C in a gaseous medium at pressures between 400 and 11,000 atmospheres and quenched by turning off the heating current. The temperature decayed exponentially with a half-life of 1.6 x 1/100 sec. The logarithm of the quenched-in electric resistance delta R decreased linearly

with increasing pressure. From the pressure effect on delta R an activation volume for vacancy formation at 680 C of delta V sub f = (9.16 ± 0.68) x 10 to the minus 24 power cc = 0.53 ± 0.04 atomic volumes is derived, assuming that the quenched-in resistivity is due to the formation of single vacancies. In the pressure range investigated, delta V ssub f is apparently independent of the pressure. Using delta V sub f and Bauerle and Koehler's relationship between the resistivity and the fractional volume change during recovery, the electric resistivity of vacancies is (1.8 ± 0.4) x 10 to the minus 6th power ohm cm/at.% and the vacancy concentration after quenching from 680 C at room pressure with 1/6 x 1/100 sec half-life of the temperature decay is (2, 4 ± 0.5) x 10 to the minus 5th power. (Author)

AD-404 174 Div. 25
(TISTM/ODN) OTS price $2.60

Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
CRYOPUMPING OF 77 K NITROGEN AND ARGON ON 10-25 DEGREES K SURFACES,
by J. A. Collins, Jr. and J. P. Dawson. May 63, 20p.
Contract AF40 600 1000, Proj. 8951, Task 895107
AEDC TDR63 51
Unclassified report

Descriptors: *Nitrogen, *Argon, *Surfaces, *Vacuum pumps, Gases, Surface temperatures, Calibration, Gas analysis, Laboratory equipment, Thermodynamics, Low-pressure research, Kinetic theory, Cryogenics, Liquefied gases.

Results are presented on the first phase of an experimental program designed to study the effects of gas and cryosurface temperatures on the capture coefficient in cryopumping. Experimental pumping speeds and capture coefficients were obtained for 77 K nitrogen and argon on a spherical cryosurface with temperatures ranging from 10 to 25 K. The capture coefficients for the two gases were found to follow exponential functions of the cryosurface temperature. These functions were found to be similar to the Boltzmann distribution law. (Author)

AD-404 176 Div. 25, 30
(TISTP/FR) OTS price $10.10

Fitro Labs., West Orange, N. J.
SOLAR RADIATION SIMULATION STUDIES, PART 2,
by W. A. Jaatinen, D. L. Rothacker, C. D. Fitz, T. H. Bull, M. A. Dachs and others. May 63, 111p.
1244 6 0
Contract AF40 600 951, Proj. 7778, Task 777801
AEDC TDR63 91 Unclassified report

In cooperation with Farrand Optical Co., Inc., New York.

Descriptors: *Solar radiation, Simulation, Sources, Xenon lamps, Mercury lamps, Electric arcs, Optical equipment components, Spectrophotometers, Optical materials.

Studies and tests performed to establish the feasibility of solar simulation systems for an environmental chamber are reported. Performance objectives for the chamber and other solar simulator systems are delineated and compared. Tests were initiated on several short-arc lamps including the 10-kw xenon lamp, the 2.5-kw xenon-mercury lamp and the fluid-transpiration arc source. The spectral energy distribution, radiant efficiency, polar diagram, intensity and uniformity as well as size and shape of the radiating medium under several conditions for each radiant source are examined. The influence of quartz envelope adsorption, envelope blackening, optical system reflectivities, detector fatigue, and standard source calibration is under evaluation. A reference module optical system concept based upon three and one half on-axis reflectors is examined. Ray tracing techniques are applied to determine the collimation and uniformity obtainable with an ideal short-arc source, and optical efficiencies of the several components are examined. Preliminary studies of the stability of simulator materials in the nuclear radiation environment of the chamber are also reported. In addition, the multiple source concept supplying a single collimator and the problems associated with refracting vs reflecting elements are analyzed. (Author)

AD-404 190 Div. 25, 22
(TISTP/JW) OTS price $19.75

Office of the Secretary of Defense, Research and Engineering, Washington, D. C.
SHOCK, VIBRATION AND ASSOCIATED ENVIRONMENTS. PART III.
Apr 63, 337p.
SD Bulletin 31, P3 Unclassified report

Descriptors: *Shock (Mechanics), *Vibration, Climatology, Test methods, Design, Measurement, Environmental tests.

AD-404 198 Div. 25
(TISTP/WH) OTS price $1.60

Aerospace Corp., El Segundo, Calif.
ELECTRONICS PROGRAM. INFRARED DEVICE RESEARCH.
Semiannual technical rept. 1 Jan-30 June 62,
by J. Munushian. 30 Oct 62, 6p. TDR69 2250 11 TR1
Contract AF04 695 69
DCAS TDR62 201
Unclassified report

Descriptors: *Recombination reactions, *Gallium alloys, *Arsenides, *Infrared image tubes, *Diodes (Semiconductors), Cooling, Infrared radiation, Intermetallic compounds.

Investigation of gallium arsenide recombination radiation and cooling properties was initiated. Work will soon commence on the evaluation and standardization of suitable standards for performance characterization of infrared image tubes. Capability for measurement and evaluation of infrared image tube characteristics is nearing completion. (Author)

AD-404 237 Div. 25
(TISTP/MFA) OTS price $3.60

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
SHORT PULSE LASERS.
Final rept.,
by R. F. Schneeberger. Oct 62, 34p. RP86 088; UB1613 E1
Unclassified report

Descriptors: *Lasers, *Ruby, Pulse amplifiers, Atomic energy levels, Instrumentation, Light pulses, Feasibility studies, Single crystals.

The feasibility of obtaining Laser operation by exciting ruby crystals with short-duration, high-intensity pulses of light obtained from an arc

source is examined. In addition, the fabrication, operation, and instrumentation of a standard-type, long-pulse Laser was undertaken. The latter object was included to allow a broader investigation into the physics of Laser problems and to serve as a basis for comparison of short-pulse results. Underlying these experimental purposes is the basic interest, namely, that the Laser is characterized by the unique features of spatial and temporal coherence of the output, giving a light source having a single wavelength output and properties similar to radio frequency generators but at a much higher frequency. (Author)

AD-404 281 Div. 25, 30
(TISTM/ODN) OTS price $9.10

Research and Advanced Development Div., AVCO Corp., Wilmington, Mass.
INVESTIGATION OF THERMAL IMAGING TECHNIQUES.
Final rept.,
by Tibor S. Laszlo and Paul J. Sheehan, Jr.
15 Mar 63, 99p. TR63 7
Contract AF19 604 7204, Proj. 4619, Task 46190
AFCRL 63 73
Unclassified report

Descriptors: *Solar furnaces, Refractory materials, Instrumentation, Controlled atmospheres, Electrical properties, Resistance (Electrical), Guidance, Control systems, Reflectors, Optical equipment, Calorimeters, Radiometers, Measurement, Oxides, Laboratory equipment, Reflection, Images, Emissivity, Zirconium compounds, Thorium compounds, Aluminum compounds, Crystals, Fluxmeters, Blackbody radiation, Distribution, High-temperature research.

Experiments and measurements which can be performed successfully in image furnaces are listed together with the necessary special instrumentation. The restrictions imposed by basic principles of image furnaces upon their operation are discussed, and methods to overcome these restrictions are proposed. Sample holders were designed and built which permit operation in controlled atmospheres with rotation of the sample on, or perpendicular to the optical axis, and which are suitable for the measurement of electrical properties at high temperatures. A fast-action, on-off shutter was designed to be operated by compressed air and vacuum. A new guidance control system was built having greater sensitivity and precision than the previous model. An experimental setup was constructed for the direct measurement of solar reflection coefficients. A 36-inch paraboloidal reflector was fabricated by a new method. A method was developed which makes it possible to calculate the temperature dependence of a property from measurements of the uneven flux distribution of the image at several peak flux values. (Author)

AD-404 468 Div. 25
(TISTP/WH) OTS price $1.60

Naval Civil Engineering Lab., Port Hueneme, Calif.
ATTENUATED TOTAL REFLECTANCE SPECTROSCOPY OF PAINT VEHICLES,
by R. J. McGowan. 15 Apr 63, 22p.
Proj. Y R007 08 302
NCEL TR R240 Unclassified report

Descriptors: *Paints, *Spectra (Infrared), *Infrared radiation, *Refraction, Films, Wave transmission.

Certain problems are encountered in using infrared transmission spectroscopy for the quantitative evaluation of paint vehicles; therefore, an investigation of attenuated total reflectance spectroscopy was conducted. In thin-film analysis, it is very difficult, if not impossible, to know the sample thickness, knowledge of which is essential in quantitative infrared transmission spectroscopy. The attenuated total reflectance technique eliminates this problem. Therefore, it was concluded that this method is superior to transmission measurements for quantitative evaluation of paint vehicles. (Author)

AD-404 494 Div. 25, 30
(TISTP/MFA) OTS price $1.60

Stanford Research Inst., Menlo Park, Calif.
MEASURMENT OF ENERGY FLUX DENSITY DISTRIBUTION IN THE FOCUS OF AN ARC IMAGE FURNACE,
by Rodney B. Beyer, Leonard McCulley, and Marjorie W. Evans. 15 Mar 63, 13p.
Contract Nonr3415 00, Proj. 004 531 236
Unclassified report

Descriptors: *Energy, *Calorimeters, Instrumentation, Carbon arc lamps, Furnaces, Bessel functions, Reflectors, Differential equations, Partial differential equations, Measurement, Design.

A calorimeter for mapping flux density in a focal volume is described. The design is based on an earlier design by Broido and Willoughby It differs chiefly in two ways. First it is much smaller in order to permit its placement inside a test specimen chamber. Second the design provides for an aperture-containing shield which is placed in front of the receiving surface calorimeter in order to limit the area of beam which is intercepted. The decay constant is 2 x .002/sec 1/sec. Flux densities ranging from 5 to 120 cal/sq. cm.-sec can be conveniently measured over intercepted beam areas of from 0.03 to 0.2 sq. cm. With this calorimeter the flux density distribution in the focal volume of a double ellipsoidal arc image furnace system was determined. (Author)

AD-404 520 Div. 25
(TISTP/MFA) OTS price $10.50

Electronic Technology Lab., Aeronautical Systems Div., Wright-Patterson Air Force Base, Ohio.
LINEAR THEORY OF BEAM-PLASMA INTERACTION,
by Yu Chin Lim. Mar 63, 125p. TR60; 05000 6 T
Contract AF33 657 8050, Proj. 4156, Task 415603
Unclassified report

Descriptors: *Plasma physics, *Electron beams, Electrons, Charged particles, Plasma oscillations, Polynomials, Functions, Perturbation theory, Statistical distribution, Statistical functions, Electric fields, Integral equations, Taylor's series, Theory, Analysis.

The interaction of a nonrelativistic beam of charged particles with a weakly ionized stationary plasma under the influence of a longitudinal field is studied with the use of Boltzmann's equation and Poisson's equation. The problem is divided into two parts, namely the stationary problem of determining the state of the system when the beam is not premodulated and the perturbed problem of determining the deviation from the stationary state when the beam is premodulated by a small signal at the entrance to the interaction region. In solving the stationary problem the effects of collisions are evaluated

by finding the eigenfunctions and their corresponding eigenvalues of the linearized collision integrals. In solving the perturbed problem use is made of the method of characteristics. By the simultaneous application of this method to both the stationary equations and the linearized perturbed equations the effects of collisions on the perturbed distributions are evaluated via those on the stationary distributions. The perturbed distribution functions therefore are obtained in terms of the stationary distribution functions and the perturbed electric field which is determined as a solution of a linear integral equation derived from the perturbed Poisson equation for perfectly reflecting boundary walls. (Author)

AD-404 522 Div. 25, 15
(TISTP/MFA) OTS price $4.60

Pennsylvania U., Philadelphia.
AN INTERPOLATION APPROACH TO THE GREEN FUNCTION THEORY OF FERROMAGNETISM,
by Raza A. Tahir-Kheli. Apr 63, 41p. TR10
Contract Nonr55136
Unclassified report

Descriptors: *Green's function, *Thermodynamics, Numerical analysis, Magnetic properties, Magnetic moments, Fourier analysis, Integral transforms, Crystal lattices, Brillouin zones, Low temperature research, High temperature research, Damping, Spin, Crystal structure, Excitation, Operators (Mathematics), Ferromagnetism.

The difficult problem of decoupling the Green functions of a Heisenberg ferromagnet is approached from an ad hoc point of view. The Green functions pertaining to spin problems do not obey a simple Dyson equation; the higher order Green function is proportional to the lower order Green function (the proportionality factor being the 'mass operator') plus an anomalous additive term. The form of both the mass operator and the anomalous term is here evaluated by requiring agreement of the theory with rigorous results known from low temperature and high temperature expansions. At low temperatures, the anomalous term makes a particularly significant correction to the results for spin 1/2, but becomes relatively unimportant for higher spins. Near the Curie temperature, however, the contribution of the anomalous term is important even for larger spin values. The resultant theory agrees with previous Curie-temperature estimates to within about one percent. (Author)

AD-404 525 Div. 25
(TISTM/PCR) OTS price $4.60

Leicester U. (Gt. Brit.).
INVESTIGATION OF THE CONDUCTION MECHANISM IN INSULATING SOLIDS.
Final technical rept. no. 3, 1 Nov 61-20 Nov 62,
by Walter Eric Spear. Nov 62, 47p.
Contract DA91 591EUC2020
Unclassified report

Descriptors: *Electric insulation, *Crystal structure, *Crystals, Crystal growth, Crystal lattices, Cadmium compounds, Sulfides, Electrodes, Diffusion, Transport properties, Electrical properties, Optical analysis, Absorption, Polarization, Sulfur, Resistance (Electrical), Low temperature research, High temperature research, Electrical conductance, Electrons, Optical properties.

The research was essentially concentrated on two main problems. The first is a fairly detailed study of the transport of electrons and holes in CdS crystals and its temperature dependence. The second is an investigation of the hole transport in orthorhombic S crystals and of some of their optical properties. (Author)

AD-404 539 Div. 25
(TISTP/MH) OTS price $8.10

RCA Defense Electronic Products, Camden, N. J.
STUDY OF THE GENERATION OF COHERENT ELECTROMAGNETIC RADIATION BY A PULSATING PLASMA.
Final rept.,
by R. E. Skinner. Feb 63, 78p.
Contract AF30 602 2510, Proj. 5561, Task 55183
RADC TDR63 135 Unclassified report

Original contains color plates; all DDC reproductions will be in black and white. Original may be seen in DDC Hq.

Descriptors: *Plasma physics, Microwaves, Electron beams, Gas ionization, Energy conversion, Cerenkov radiation, Magnetic fields, Modulation, Cesium, Electron guns, Radiofrequency power.

Coherent radiation from a plasma stimulated by a modulated electron beam at frequencies above the hybrid frequency was observed, with electronic gains of more than 20 db. The measurements were made in the 3.95-to 5.85-gc region. The cyclotron frequency was 2.90 gc and the hybrid frequency was less than 3.18 gc. The experiment was performed with a cesium plasma. The experiments, their results, and the experimental facilities are described. The facilities consist of an extremely versatile, demountable, bakeable vacuum system with a magnet which produces a highly uniform field over the region occupied by the plasma. (Author)

AD-404 556 Div. 25
(TISTM/ODN) OTS price $3.60

Aerospace Corp., Los Angeles, Calif.
FRACTURE AND TWINNING IN SAPPHIRE (ALPHA - A1203 CRYSTALS),
by E. Stofel and H. Conrad. 15 Mar 63, 30p.
TDR169 3240 11TN4
Contract AF04 695 169
SSD TDR63 29 Unclassified report

Descriptors: *Sapphires, *Aluminum compounds, *Single crystals, High-temperature research, Tensile properties, Deformation, Stresses, Crystals, Ceramic materials, Compressive properties, Fracture (Mechanics), Oxides.

The fracture behavior of 60 degree oriented sapphire crystals was investigated for both tension and compression. Plastic flow on the basal plane was found to be a factor in reducing the tensile stress required to produce fracture in the temperature range 1100 to 1500 C. Mechanical twins, both (0001) and (0111) types, were produced by compression in the temperature range 1100 to 1300 C. Cracks propagated more readily along the twin boundaries than in the nontwinned crystal. (Author)

AD-404 574 Div. 25
(TISTE/CAM) OTS price $5.60

Selenia, S.P.A., Rome (Italy).
MICROWAVE INVESTIGATION OF THE DIELECTRIC WAVE-

GUIDE PROPAGATION BY MAGNETO-IONIC DUCTS.
Technical summary rept. no. 2, 1 Apr 60-31 Dec 61,
by Ing. A. Gilardini. July 62, 1v.
Contract AF61 052 145
AFCRL 63 81 Unclassified report

Descriptors: *Electromagnetic waves, *Plasma physics, *Propagation, *Waveguides, Electron beams, Theory, Analysis, Atmospherics, Ionosphere, Mathematical analysis, Measurement, Magnetic fields.

A description is presented of the theoretical and experimental work performed on the propagation of electromagnetic waves along plasma columns in logitudinal magnetic fields. Theoretical work includes: completion of the basic theory for propagation along plasma columns in magnetic fields; derivation of Brillouin diagrams; and discussion of particularly significant limits and preliminary analyses of the non-uniform plasma case. Experimental work includes: measurements of basic propagation parameters; transmitted signal; wavelength and group velocity; and of physical plasma parameters as the electron density. (Author)

AD-404 613 Div. 25, 4, 7
(TISTM/PCR) OTS price $1.10

Stanford Research Inst., Menlo Park, Calif.
THERMOELECTRIC MATERIALS.
Bimonthly progress rept. no. 20, 1 May-1 July 62,
by J. W. Johnson. 17 July 62, 4p.
Contract NObs77017, SRI Proj. SU2681
Unclassified report

Descriptors: *Thermoelectricity, Thermal conductivity, Electrical properties, Copper compounds, Sulfides, Tellurides, Resistance (Electrical), Test methods, High temperature research, Mixtures, Tables, Materials.

AD-404 614 Div. 25, 4, 7
(TISTM/PCR) OTS price $1.10

Stanford Research Inst., Menlo Park, Calif.
THERMOELECTRIC MATERIALS.
Bimonthly progress rept. no. 21, 1 July-1 Sep 62,
by J. W. Johnson. 14 Sep 62, 5p.
Contract NObs77017, SRI Proj. SU2681
Unclassified report

Descriptors: *Thermoelectricity, Electrical properties, Copper compounds, Sulfides, Bismuth compounds, Resistance (Electrical), High temperature research, Mixtures, Tables, Nickel compounds, Test methods, Tellurides, Lead compounds, Materials.

AD-404 615 Div. 25, 4, 7
(TISTM/PCR) OTS price $1.10

Stanford Research Inst., Menlo Park, Calif.
THERMOELECTRIC MATERIALS.
Bimonthly progress rept. no. 22, 1 Sep-1 Nov 62,
by J. W. Johnson. 15 Nov 62, 3p.
Contract NObs77017, SRI Proj. SU2681
Unclassified report

Descriptors: *Thermoelectricity, Copper compounds, Iron compounds, Sulfides, Resistance (Electrical), High temperature research, Tables, Electrical properties, Mixtures, Test methods, Materials.

AD-404 625 Div. 25, 2
(TISTE/JWS) OTS price $1.60

Navy Underwater Sound Lab., Fort Trumbull,
New London, Conn.
THE EFFECT OF BOUNDARIES ON THE SPATIAL CORRELATION OF NOISE FIELDS,
by Benjamin F. Cron and Charles H. Sherman.
25 Mar 63, 11p.
Proj. SS050 000 1562
USL 570 Unclassified report

Descriptors: *Noise, *Mathematical models, Correlation techniques, Sound transmission, Frequency, Pressure, Reflection, Acoustic properties, Underwater, Surfaces.

The effect of boundaries on the spatial correlation of noise fields is investigated. Two types of noise fields are considered; namely, a volume noise model and a surface noise model. The volume noise model consists of a field of plane waves, equally probable in all directions. This homogeneous-isotropic noise field is modified by the addition of a perfectly reflecting soft surface. The addition of the boundary results in a nonisotropic, nonhomogeneous wave field. Equations for the spatial correlation are obtained and curves are drawn showing the dependence of spatial correlation on the orientation of the point receivers and the distance from the soft surface. This analysis repeated for a hard bottom. (Author)

AD-404 642 Div. 25, 20
(TISTP/FEM) OTS price $1.10

General Atomic Div., General Dynamics Corp.,
San Diego, Calif.
THE CALCULATION OF LINE WIDTHS,
by M. Baranger and J. C. Stewart. 13 Aug 59,
8p. 927
Contract AF18 600 1812, Proj. 52
Unclassified report

Descriptors: *Line spectrum, *Quantum mechanics, Plasma physics, Electron density, Nuclear scattering, Nuclear cross sections, Perturbation theory, Inelastic scattering, Ions, Integrals, Equations, Electrons, Field theory.

AD-404 651 Div. 25, 8
(TISTM/AW) OTS price $1.60

Institute of Science and Tech., U. of Michigan,
Ann Arbor.
EFFECT OF CHEMISORBED OXYGEN ON PHOTOVOLTAIC AND PHOTOCONDUCTIVE PROCESSES IN RUTILE,
by R. Keezer. May 63, 8p. 2900 400R
Contract DA36 039sc78801
Unclassified report

Descriptors: *Photoelectric effect, *Titanium compounds, *Semiconductors, Photoconductivity, Chemisorption, Time, Pressure, Dioxides, Surface properties, Mathematical models, Oxygen.

The presence of adsorbed oxygen increases both the response and the response time for the photovoltaic effect in rutile. The model for the effect of chemisorbed oxygen on the photoconductivity has been modified to take into consideration the effect of oxygen pressure. The conductance of rutile has been measured as a function of oxygen pressure. The results agree with the modified model. The increase in photovoltaic response and response time with exposure to oxygen has been explained in terms of the barrier layer formed by chemisorbed oxygen. (Author)

26. PRODUCTION AND MANAGEMENT

AD-403 514 Div. 26, 17
(TISTM/PCR) OTS price $2.60

Du Pont Metals Center, E. I. du Pont de Nemours and Co., Inc., Baltimore, Md.
COLUMBIUM ALLOY EXTRUSION PROGRAM. PHASE V: TUBING PROGRAM.
Interim technical documentary progress rept. no. 8, 15 Jan-15 Apr 63,
by E. V. Peterson. 15 Apr 63, 21p. 7 775
Contract AF33 600 40700

Unclassified report

Descriptors: *Niobium alloys, *Extrusion, Pipes, Manufacturing methods, Heat treatment, Reduction, Molybdenum alloys, Vanadium alloys, Zirconium alloys, Tungsten alloys, Carbon alloys, Metallurgy.

The extrusion of three B-66 (Cb-5Mo-5V-1Zr) billets completed the extrusion part of the program. The processing of D-43, previously designated X-110, (Cb-10W-1Zr-0.1C) tube blanks was continued. Some of the blanks have been processed through four reductions with 2600 F anneals after the first and third reduction. The outside surfaces are good. The inside surfaces have been improved by in-process conditioning, but a few defects still remain. Attempts to make first reductions on the B-66 blanks resulted in cracking. The conditions that appear necessary for tube reducing the B-66, namely warm working, are beyond the scope of the present contract. Consequently, the work with B-66 was suspended, except for one piece of material which survived the first tube reduction. (Author)

AD-403 641 Div. 26, 15
(TISTP/MH) OTS price $6.60

Mechanical Technology Inc., Latham, N. Y.
STABILITY ANALYSIS OF GAS LUBRICATED SELF-ACTING PLAIN CYLINDRICAL JOURNAL BEARINGS OF FINITE LENGTH, USING GALERKIN'S METHOD,
by H. S. Cheng and C. H. T. Pan. 19 Apr 63, 35p. 63TR15
Contract Nonr373000

Unclassified report

Descriptors: *Gas bearings, Cylindrical bodies, Journal bearings, Reynolds number, Differential equations, Fluid flow, Loading, Stability.

One of the most important considerations in designing a high-speed, gas-lubricated, self-acting journal bearing is the instability of the journal under a given operating condition. Intensive research in this direction has led to a number of significant contributions in the past five years. The present paper extends the method of Cheng and Trumpler to study the stability of plain cylindrical gas journal bearings of finite length. Both equilibrium and stability results were obtained. (Author)

AD-403 885 Div. 26
(TISTB/AW) OTS price $2.60

Hercules Powder Co., Bacchus, Utah.
MAKE OF BUY PROGRAM. M57A-1 STAGE III MINUTEMAN MOTOR.
1963, 19p.
Contract AF04 694 270

Unclassified report

Descriptors: *Management engineering, *Industrial procurement, Industrial relations, Job analysis, Costs, Distribution (Economics), Reliability, Solid rocket propellants.

Outlined is the Hercules Powder Company Make or Buy Program. Make or Buy decisions are arrived at after a comprehensive review and evaluation by management of all known factors. Initially, decisions to make are formed upon the factors of facilities, manufacturing knowhow, adaptability, etc. After formulating a decision of make from these factors, studies are then conducted into the areas of unit cost, transportation, management control, etc., the result of which confirms or changes the make decision. Unit cost consideration is based and weighted upon detailed, comprehensive cost analyses of both in-house manufacture and vendor furnished costs. Hercules basis for vendor selection is predicated on an initial Vendor Survey followed by successful contractual performance in areas of quality, capability, delivery and final qualification of the product to prescribed standards using various reliability techniques. (Author)

AD-403 926 Div. 26, 4
(TISTM/PCR) OTS price $3.60

Birmingham U. (Gt. Brit.).
WOVEN WIRE PACKINGS.
Final technical status rept., Jan 61-Dec 62.
Dec 62, 1v.
Contract DA91 591EUC1680

Unclassified report

Descriptors: *Distilling plants, *Wire, *Packing materials, Distillation, Wire-winding machines, Tests, Equations, Mathematical analysis, Industrial equipment, Textiles.

A promising modification to the original KnitMesh Multifil packing was developed and tested. In this modification the original spirally-wound mesh arrangement was replaced by a series of parallel, vertical layers of mesh. By this arrangement the central region of high density, which in the original KnitMesh is thought to cause the severe liquid maldistribution and poor distillation performance, is removed. At the same time the vertical layers of mesh, which were shown to be desirable for good mass-transfer, are retained. (Author)

AD-403 990 Div. 26, 17
(TISTM/AMS) OTS price $3.60

Armour Research Foundation, Chicago, Ill.
CO-REDUCTION AND CONSOLIDATION OF Mo-0.5Ti-0.1C ALLOY.
Final rept., 27 Apr 61-31 Oct 62,
by John J. Rausch and Charles R. Simcoe.
4 Feb 63, 28p. B224-5
Contract NOw61 0548

Unclassified report

Descriptors: *Molybdenum alloys, *Powder metallurgy, Powder metals, Grain structures (Metallurgy), Titanium alloys, Carbon alloys, Chlorides, Sintering, Controlled atmospheres, Low pressure research, Hot working, Cold working, Mechanical properties, Magnesium compounds, Oxides, Transition temperature, Tensile properties, Halides, Low temperature research, Molybdenum compounds, Titanium compounds, Carbon compounds, Manufacturing methods, Microstructure.

Co-reduction of preblended halides by a modified Kroll Process has been investigated as a means of producing prealloyed Mo-Ti-C powders. Processing parameters were varied in an attempt to produce

a composition similar to that of commercial Mo-0.5Ti alloy. This was successfully accomplished except for an abnormally high oxygen content. The oxygen present in the material caused compositional variations during subsequent processing and resided as a finely dispersed Mg-Ti-O phase. (Author)

AD-404 017 Div. 26, 15
(TISTP/GRW) OTS price $2.60

RAND Corp., Santa Monica, Calif.
TABLES OF RANDOM SAMPLE SIZES NECESSARY TO ESTIMATE MEAN AND AGGREGATE VALUES.
by R. Gene Brown. Apr 63, 24p. RM3537PR
Contract AF49 638 700

Unclassified report

Descriptors: *Operations research, *Sampling, Statistical analysis, Tables, Industrial plants.

This analysis presents examples of 16 tables of random sample sizzes necessary to estimate mean and aggregate values. The tables provide a readily useful tool for determining an appropriate sample size once the person designing a plan makes certain quantitative statements. The tables were developed as an aid in using sampling methods to estimate such financial characteristics of a total inventory as its aggregate dollar value or average value per line item stored. The computed tables permit the estimator to select the amount of precision and confidence desired in the estimate of total population characteristics. (Author)

AD-404 026 Div. 26, 17
(TISTM/AMS) OTS price $3.60

Universal-Cyclops Steel Corp., Bridgeville, Pa.
INFAB PROCESSING OF TZM SHEET.
Interim technical engineering rept. no. 4, 15 Jan-15 Apr 63, on Phase 4,
by F. R. Cortes. Apr 63, 29p.
Contract AF33 657 8495
ASC TR7 786, V4

Unclassified report

Descriptors: *Molybdenum alloys, *Hot working, Titanium alloys, Zirconium alloys, Carbon alloys, Sheets, Heat treatment, Ductility, Tensile properties, Hardness, Transition temperature, Impurities, Grain structures (Metallurgy), Heat resistant metals and alloys, Recrystallization, Impurities.

AD-404 100 Div. 26, 17
(TISTM/AMS) OTS price $1.60

Armour Research Foundation, Chicago, Ill.
DISPERSION-STRENGTHENED VANADIUM ALLOYS.
Bimonthly progress rept. no. 2, 14 Feb-13 Apr 63,
by A. L. Hess, F. C. Holtz and L. B. Richard.
8 May 63, 13p. B6007 2
Contract N600 19 59567

Unclassified report

Descriptors: *Dispersion hardening, *Vanadium alloys, Manufacturing methods, Heat treatment, Hot working, Cold working, Niobium alloys, Zirconium alloys, Tantalum alloys, Low pressure research, Hardness, Sheets, Stresses, Creep, Titanium alloys, Oxides, Carbides, Powder metallurgy, Aluminum compounds, Cerium compounds, Lanthanum compounds, Thorium compounds, Yttrium compounds, Hafnium compounds, Zirconium compounds, Dispersion hardening.

Arc-melting and powder metallurgy techniques are used to incorporate fine, refractory dispersants in vanadium-columbium base alloys in order to improve their long-time, elevated-temperature strength properties. Solution annealing and aging studies of arc-melted alloys containing hafnium or zirconium in combination with carbon indicate that the hafnium carbide phase is more stable. The hydride process was used to obtain powders of V-60w/o Cb-1w/o Ti, to which fine oxide or carbide powders were added. After blending, cold-compacting, sintering at 2800 F, and annealing at 2000 and 2400 F, specimens containing alumina and thoria exhibited a high degree of reactivity with the alloy base. Improved stability was noted in the alloys containing ceria, lanthana, yttria, hafnium carbide, and zirconium carbide. (Author)

AD-404 111 Div. 26, 17
(TISTM/AMS) OTS price $1.10

New England Materials Lab. Inc., Medford, Mass.
DISPERSION STRENGTHENED NICKEL-BASE ALLOYS.
Progress rept. no. 1, 1 Mar-30 Apr 63.
by A. S. Bufferd, R. C. Nelson, and N. J. Grant.
15 May 63, 5p.
Contract N600 19 59891

Unclassified report

Descriptors: *Dispersion hardening, *Nickel alloys, Chromium alloys, Powder metallurgy, Extrusions, Thorium compounds, Oxides, Powder metals.

Dispersion strengthened nickel-base alloys (80% nickel - 20% chromium) have been prepared by the mechanical mixing of Nichrome and thorium oxide powders. Extruded bar stock was prepared by powder metallurgical techniques and is presently being evaluated with respect to mechanical properties and microstructure. (Author)

AD-404 248 Div. 26
(TISTM/AW) OTS price $1.10

General Dynamics Convair, San Diego, Calif.
MATERIAL - WELDING ELECTRODES - P&H BA91 (HARNISCHFEGER CORPORATION) WELD STRENGTH AFTER HEAT TREATMENT,
by A. Guintoli, H. C. Turner, and W. M. Sutherland. 12 May 58, 4p. 8926 154
Contract AF33 657 8926

Unclassified report

Supersedes rept. no. 8926-154, AD-402 174.

Descriptors: *Welding rods, Welds, Heat treatment, Steel, Mechanical properties, Effectiveness.

Single groove, vee-joint butt welds with a 1/8 in. root spacing were made in 1/8-in. thick, annealed 4340 steel using P&H BA91 (Harnischfeger Corporation) welding electrodes for two pass, reverse polarity, DC welding. After welding the weldments were normalized (1600 F, 1-1/2 hr, air cool), austenitized (1550 F, 1-1/2 hr, oil quench) and double tempered (800 F, 2 hr, air cool, 800 F, 2 hr, air cool). The ultimate strength of the heat treated parent material was 182.0 KSI, and of the welds 170.9 KSI (10 specimens). The weld efficiency thus was 94%. (Author)

AD-404 286 Div. 26, 17, 27
(TISTM/AMS) OTS price $5.60

Aerojet-General Corp., Downey, Calif.
EXPLOSIVE FORMING OF CLOSURES FOR LARGE SOLID PROPELLANT MOTOR CASES.
Quarterly progress rept. no. 4, 17 Jan-17 Apr 63,

by A. W. Hall and I. Lieberman. 30 Apr 63, 1v.
0665 01 040P
Contract AF04 611 8395
Unclassified report

Descriptors: *Explosive forming, *Rocket closure cups, *Steel, Welding, Welds, Ductility, Brittleness, Dies, Heat treatment, Fracture (Mechanics), Ice, Nickel alloys, Thickness, Microstructures, Experimental data, Shaped charges.

The contour of an explosively formed closure is affected by the charge configuration. Design of the charge shape to give optimum reproducible closure contour would eliminate many problems in the fabrication of large size rocket closures. The initial results of closure contours as affected by variations in explosive configuration are presented in this report. Formability of 18% nickel maraging steel and the weldability of this material by explosive pressures are also briefly described herein. (Author)

AD-404 641 Div. 26, 17
(TISTM/AMS) OTS price $1.60

Narmco Industries Inc., San Diego, Calif.
THE INVESTIGATION OF EXOTHERMIC BRAZING OF REFRACTORY ALLOYS.
Quarterly rept no. 1, 1 Nov 62-31 Jan 63,
by R. O. Banning, J. R. Armstrong, and R. A. Long. 31 Jan 63, 15p.
Contract N600 19 59237
AEC NP12615
Unclassified report

Descriptors: *Brazing, *Heat resistant metals and alloys, Molybdenum, Tungsten, Niobium, Tantalum, Soldering alloys, Heat of reaction, Temperature.

Heat-producing as well as heat and metal-producing exothermic systems for brazing of refractory alloys were evaluated. Characteristics taken into consideration were: heat of reaction, ignition temperature, metal production, metal-ceramic composite characteristics, and base metal-exotherm compatibility. Brazed joints were made in unalloyed molybdenum, tungsten, columbium and tantalum, using commercially-available brazing alloys with flow temperatures ranging up to 3100 F. Brazing was accomplished in air without protective atmospheres with essentially no oxidation or contamination of the base metals. (Author)

27. PROPULSION SYSTEMS

AD-403 700 Div. 27
(TISTE/JBM) OTS price $2.00

Technische Hochschule, Aachen (Germany).
INVESTIGATION OF THE GENERAL STRESS DISTRIBUTION IN IMPELLER WHEELS.
Final rept., Apr-Dec 61,
by Wilhelm Dettmering and Wilhelm Soetebeer.
Mar 63, 62p.
Contract AF61 052 520, Proj. 7351, Task 73521
ASD TDR62 1013 Unclassified report

Report on Stress Investigations on Impeller Wheels.

Descriptors: *Impellers, *Turbine wheels, *Compressor blades, Analysis, Theory, Data, Equations, Configuration, Plastics, Differential equations, Matrix calculus, Difference equations, Models (Simulation), Test equipment, Temperature, Stresses.

An investigation was made of the general stress distribution in impeller wheels. A detailed illustration of new calculation data is presented. Data for rotating wheels is given. Efforts were made to find a method of calculation which would do the fullest possible justice to the complicated geometric design of impeller wheels. Different influences such as the number of blades, plane temperature fields, varying shell slopes etc. were examined. A description of the experimental analysis of stresses in impeller wheels is given. It covers a representation of the preliminary design of the model, the materials of which the models were made, the testing equipment and the initial test results. (Author)

AD-403 924 Div. 27
(TISTP/JEA) OTS price $2.60

Ogden Air Materiel Area, Hill Air Force Base, Utah.
SHELF AND SERVICE LIFE TEST OF ROCKET MOTORS, M16E3 FOR MACE (TM-76),
by Robert M. Cavett. Mar 63, 23p.
OOY TR63 11
Unclassified report

Descriptors: *Guided missiles (Surface to surface), *Rocket motors (Solid propellants), Air Force, Reliability, Life expectancy, Temperature, X-ray photography, Malfunctions, Specifications, Tests.

Tests were conducted to determine the feasibility of extending the combined service and shelf life of the M16E3 Rocket Motor for the TM-76 Missile System. Inspection, both visual and radiographic, along with static firing was accomplished on five motors, age 52 months. Tests were conducted at -30 F and +160 F. X-ray examination revealed several small propellant defects; they did not have an adverse effect on performance. No malfunctions occurred and ballistic parameters were within specification limits. It is recommended that the combined service and shelf life of the M16E3 Rocket Motor be extended to five years. (Author)

AD-404 008 Div. 27, 14
(TISTA/GEC) OTS price $1.60

Hercules Powder Co., Bacchus, Utah.
TEST PLAN FOR EVALUATION OF PHASE I RTS ATTACHMENT BOND SYSTEM SEQUENCE 1, WING VI STRUCTURAL PROGRAM.
10 May 63, 11p. MT0858 1 3
Contract AF04 694 270
Unclassified report

Descriptors: *Rocket motors (Solid propellant), Attachment, Bonding, Design, Glass textiles, Synthetic rubber, Tests, Epoxy plastics, Adhesives, Hydrostatic pressure, Guided missiles (Surface to surface), Thrust reverse.

Evaluation was made of a suitable bonding system for attachment of the Phase I Reverse Thrust package to the Stage III chamber. Preparation and installation of the components are discussed and illustrated in this report. Hydrotest and pressurization sequence, pressure rate, and elapse time are presented. (Author)

AD-404 094 Div. 27
(TISTA/GEC) OTS price $4.60

Marquardt Corp., Ogden, Utah.
RESULTS OF THE PHASE I LONG-TERM ENVIRONMENTAL

STORAGE TEST PROGRAM FOR THE RJ43-MA-11 RAMJET ENGINE OCTOBER 1960 THROUGH MARCH 1963,
by W. A. Whitney. 1 May 63, 36p. 15081
Contract AF33 657 7770, Proj. 273
Unclassified report

Descriptors: *Ramjet engines, Storage, Combustion chambers, Control systems, Vibration, Impact shock, Calibration, Containers, Guided missiles (Surface to air), Environmental tests.

A long-term storage evaluation during CY 1960 under Air Force Contract AF 33(600)-40636 was made to document the effects of tactical site environment on the storage capability of the RJ43-MA-11 engine. The phase of testing reported herein covers the documentation of long-term storage effects on the engine, combustion chamber, and spare fuel control unit when stored in their respective shipping/storage containers. Tests conducted subjected the engine and fuel control unit to vibration and shock loads normally encountered during cross-country shipment, accelerated storage under severe environmental conditions, and long-term (24 months) storage under actual tactical environmental conditions. Effects of the environmental tests on the engine and fuel control unit were evaluated by comparison of pre- and post-storage calibration data and by complete disassembly and inspection of the test items for signs of deterioration. The storage evaluation showed that with a minimum of maintenance effort, the respective storage containers provide a satisfactory storage environment for engines, combustion chambers, and spare fuel control units under tactical environmental conditions. Confidence in the functional capability of the engine and fuel control unit was demonstrated by the excellent agreement shown between the pre- and post-storage calibration data. (Author)

AD-404 300 Div. 27, 17
(TISTM/AM) OTS price $9.60

Aerojet-General Corp., Sacramento, Calif.
EVALUATION OF HIGH-NICKEL STEEL FOR APPLICATION IN LARGE BOOSTER MOTOR FABRICATION.
Quarterly progress rept. no. 3, Jan-Mar 63.
Apr 63, 1v. 0705 8203
Contract AF33 657 8740, Task 738101
Unclassified report

Descriptors: *Rocket motors (Solid propellant), *Booster rockets, Steel, Nickel alloys, Mechanical properties, Metal plates, Sheets, Materials, Welding, Melting, Aging (Materials), Martensite, Toughness, Fracture (Mechanics), Impact shock, Microstructure, Rolling mills, Hardness, Chemical analysis, Rocket cases.

The results of investigations conducted to determine the mechanical and metallurgical properties and weldability of the 18%-nickel maraging alloy steels. The information in this report relates specifically to the results of studies conducted to: (1) establish the mechanical and metallurgical properties, including fracture toughness, of parent-metal 18%-nickel alloy steels processed by different melting techniques; (2) determine the effect of varying weld-wire compositions on the mechanical and metallurgical properties of TIG-welded 1/2-in.-thick material; (3) determine the effect of the MIG and submerged-arc process on the mechanical and metallurgical properties of welded 1/2-in.-thick material; and (4) determine the fracture toughness of weld deposits and heat-affected zones. The selection of an optimum material was based on the results of these studies. A supplemental program, which has increased the scope of fracture-toughness testing, was authorized. Progress made on this supplemental program is also presented. (Author)

28. PSYCHOLOGY AND HUMAN ENGINEERING

AD-404 051 Div. 28, 5
(TISTP/AW) OTS price $2.60

System Development Corp., Santa Monica, Calif.
INTELLIGIBILITY OF THE PHONETIC ALPHABET WHEN MASKED BY RANDOM WHITE NOISE,
by R. P. Cunningham and M. S. Sheldon. 2 Apr 63, 21p. TM886 000 01
Contract AF19 628 1648
Unclassified report

Descriptors: *Speech recognition, *Vocabulary, Signal-to-noise ratio, Training, Errors, Intelligibility.

The Listen Study was designed to develop and test a training method to increase the ability of Air Force personnel in identifying verbal signals masked by jamming. Findings relating to alphabet intelligibility are presented. There was widespread variation in the percentage of times the 26 words used in the military alphabet were missed when masked by random white noise. (Author)

AD-404 052 Div. 28, 30
(TISTB/AW) OTS price $3.60

Washington U., St. Louis, Mo.
CONFLICT, INTERFERENCE AND AGGRESSION: COMPUTER SIMULATION OF A SOCIAL PROCESS,
by Rodney M. Coe. 23 Apr 63, 29p. TR17
Contract Nonr81611, Proj. NR170 424
Unclassified report

Descriptors: *Social sciences, *Behavior, Group dynamics, Sociology, Simulation, Computers.

Programs can be written to reproduce results from field research and, based on these results, various situations which yield theoretically relevant data can be examined in detail. Simulator programs appear to have two main advantages: first, they permit utilization of the favorable characteristics of high-speed computers, that is, speed, accuracy, control of variables, etc.; second, and most important, they permit the researcher to test hypotheses deduced from theory. As experimentation progresses and experience accumulates, it should be possible to design and carry out highly sophisticated simulator programs. It is clear that simulation is not supposed to replace field research, but to supplement it. The increased usefulness of simulators will depend upon technological improvements in development of computers, but also, especially for social scientists, upon the increasing accuracy and scope of social research in the field. In sum, computer simulation is a relatively new research tool and like questionnaire, psychometric examinations, etc., it has certain limitations, but also great potential for the advancement of knowledge in social science. (Author)

AD-404 055 Div. 28, 22
(TISTB/AW) OTS price $6.60

Human Engineering Lab., Aberdeen Proving Ground, Md.
GUNNER TRACKING BEHAVIOR AS A FUNCTION OF THREE DIFFERENT CONTROL SYSTEMS,
by Robert T. Gschwind. Jan 63, 59p.
HEL TM2 63 Unclassified report

Descriptors: *Tracking, Antitank ammunition,

Errors, Human engineering, Tank turrets, Rockets, Ranges (Distance), Motion, Gunnery, Lead angle, Optical systems, Gun mounts.

An investigation was conducted to determine the magnitude and character of tracking errors occurring after firing a rocket at a moving target from a lightweight mount. Six professional gunners with varying degrees of experience fired 3.5-inch rockets from each of three distinct types of tracking devices, viz., a two-hand wheel system, an electrical rate system, and a viscously-damped, integrated position control system (free mount). There was no significant difference in magnitude of tracking error between the free mount and the rate system, with both achieving 0.5 mils RMS error across all conditions of angular rate. The two-hand wheel system was significantly worse with 1.0 mils error at low rates and 2.0 mils error at high rates. (Author)

AD-404 229 Div. 28
(TISTP/FEM) OTS price $.75

Florida State U., Tallahassee.
THE EFFECTS ON TRANSFER OF TIME DELAY AND TASK SIMILARITY: A LITERATURE REVIEW.
Final rept., 1 June 59-28 Feb 61,
by Joel Greenspoon. Mar 63, 21p.
Contract AF33 616 6408, Proj. 7183, Task 718306
AMRL TDR63 22
Unclassified report

Report on Psychological Research on Human Performance.

Descriptors: *Behavior, *Transfer of training, Reaction (Psychology), Stimulation, Time, Motivation, Verbal behavior, Measurement, Motor reactions, Learning, Theory.

A review of selected literature pertinent to the effects of similarity and delay on transfer is reported. Emphasis is given to the more recent research and that which seems to make a greater contribution to knowledge of these effects - especially studies in which similarity and time delay were manipulated jointly. Although considerable research has been accomplished, the effects of similarity and time delay (either singly or jointly) are not known with sufficient precision to enable satisfactory use outside of the narrowly constrained laboratory contexts, if even there. Effective prediction on the basis of similarity will depend on the development of a rigorous and reliable technique for its measurement. The effects of delay can only be adequately determined after this is accomplished. (Author)

AD-404 275 Div. 28, 18
(TISTB/AW) OTS price $11.00

Operational Applications Office, Air Force Electronic Systems Div., Bedford, Mass.
TACTICAL DECISION MAKING: I. ACTION SELECTION AS A FUNCTION OF TRACK LOAD, THREAT COMPLEXITY, RELIABLE DATA PRESENTATION AND WEAPON UNCERTAINTY,
by Wyatt R. Fox and W. H. Vance, Jr. Nov 61, 141p.
Proj. 4690, Task 46902
ESD TDR61 42; AFCRL 997 Unclassified report

In cooperation with Detection Physics Lab., Air Force Cambridge Research Labs., Bedford, Mass.

Descriptors: *Decision making, *Command and control systems, Targets, Errors, Test methods, Simulation, Training, Defense systems, Military tactics.

Performance measures from the first major experiment in a series on tactical decision-making for treat evaluation and action selection in aerospace surveillance are described. Two groups of experimental commanders performed under several levels of target track load and threat complexity conditions. The task of the commanders was: (1) to minimize damage to the weapon areas, (2) to destroy a maximum number of threatening vehicles, (3) to conserve counter weapons so as to consume a minimum of forces consistent with objectives (1) and (2) above, and (4) to develop his own strategy under constraints imposed by the ground rules. In order to provide some standard performance criteria, a sample of the experimental problems was solved analytically so as to represent both 'good' and 'poor' automated decision making and 'idealized' or maximum human performance. Human empirical scores compared favorably with analytical performance measures. Human empirical performance continuously improved as a function of number of system runs. (Author)

AD-404 478 Div. 28
(TISTB/AW) OTS price $1.60

Human Resources Research Office, George Washington U., Washington, D. C.
THE EFFECTS OF TWO TYPES OF COORDINATE SYSTEMS ON LOCALIZATION OF PERIPHERAL LIGHT FLASHES,
by Alfred J. Kraemer and David L. Easley.
Apr 63, 12p.
Contract DA44 188ARD2, Task 11 27
Unclassified report

Descriptors: *Vision, *Visual signals, Errors, Density, Viewing screens, Perception, Test methods.

Ten groups of subjects localized single flashes, viewing monocularly, and responding with a projection pointer. Flash sources were located within a 64-degree circular field in a blacked-out room. One group saw only a fixation point. For another group only a cross was projected. Four groups were shown Cartesian coordinates, and four groups were shown polar coordinates. The density of the coordinate lines for the respective groups was increased by successive rectangular or polar bisection of the coordinate units, beginning with the cross. There were no appreciable differences in localization error between the groups which used one type of coordinate system and those which used the other. Introduction of the coordinate cross, and the bisection of the cross, led to successively smaller errors in localization, but futher increases in line density did not. All groups made constant errors of localizing flashes closer to the visual axis than they actually were. (Author)

AD-404 511 Div. 28, 18
(TISTB/AW) OTS price $4.60

Michigan State U., Coll. of Communication Arts, East Lansing.
THE FALLOUT PROTECTION BOOKLET: I. A REPORT OF PUBLIC ATTITUDES TOWARD AND INFORMATION ABOUT CIVIL DEFENSE,
by David K. Berlo, Erwin P. Bettinghaus, Dan Costley and Robert Van Dam. Apr 63, 1v.
Contract OCD OS62 19
Unclassified report

Descriptors: *Civil defense systems, *Nuclear warfare, Handbooks, Effectiveness, Data, Radioactive fallout, Survival, Shelters, Sociometrics, Public opinion, Attitudes.

A study was made of the impact of the 'Fallout Protection' booklet which was published by OCD in December of 1961. While collecting data spe-

cific to that objective, other useful information relevant to public information about and attitudes toward civil defense was collected. In this report are presented data on the accuracy of public knowledge about nuclear attack and civil defense, the favorability of public attitudes toward civil defense measures, public perceptions of the threat of nuclear war and the personal dangers represented by nuclear attack, the relative effectiveness of various shelter inducements and inducement agents, and the level of public exposure to shelter information. Analyses of attitudinal and demographic correlates of shelter knowledge, belief, and plans are also presented. (Author)

AD-404 512 Div. 28, 18
(TISTM/AW) OTS price $1.60

Michigan State U. Coll. of Communication Arts, East Lansing.
THE FALLOUT PROTECTION BOOKLET: II. A COMPARISON AMONG FOUR GROUPS OF DIFFERING LEVELS OF INTEREST IN SHELTER CONSTRUCTION,
by David K. Berlo. Apr 63, 1v.
Contract OCD OS62 19
Unclassified report

Descriptors: *Civil defense systems, *Nuclear warfare, Shelters, Survival, Sociometrics, Radioactive fallout, Data, Handbooks, Effectiveness, Public opinion, Attitudes.

A study was made of the impact of the 'Fallout Protection' booklet which was published by OCD in December of 1961. While collecting data specific to that objective, other useful information relevant to public information about and attitudes toward civil defense was collected. Report #1 presented data on the accuracy of public knowledge about nuclear attack and civil defense, the favorability of public attitudes toward civil defense measures, other estimates of the public as to the threat of nuclear war and the relative effectiveness of various shelter inducements and inducement agents, and indices of public exposure to shelter information. Report #1 also analyzed attitudinal and demographic correlates of shelter knowledge, beliefs, and plans. This report is the second of a series of four. Data are presented from an analysis of respondents, who were classified into four levels of interest with respect to constructing family shelters. Report #3 will summarize a methodological study which compared the pretest responses of those who responded, refused, or were non-reachable on the post-test. Finally, Report #4 will present the major findings of the impact of the 'Fallout Protection' booklet. (Author)

29. QUARTERMASTER EQUIPMENT AND SUPPLIES

AD-403 714 Div. 29, 20
(TISTM/CCH) OTS price $15.00

Cornell U. School of Hotel Administration, Ithaca, N. Y.
FOOD SERVICE PROCEDURES IN FALLOUT SHELTERS.
30 Apr 63, 204p.
Contract OCD OS62 49
Unclassified report

Descriptors: *Food dispensing, *Radioactive fallout, Food, Training, Personnel management, Nutrition, Control, Preparation, Sanitary engineering, Waste (Sanitary engineering), Water, Disposal, Odors, Temperature, Light, Storage, Civil defence systems, Humidity, Energy, Instrumentation, Heating, Energy conversion, Containers, Management engineering, Shelters.

Contents:
Organization and management of food services
The nature of the problem
Policies of the food manager
Organization of the food services
Orientation and training
Other personnel management problems
Foods and feeding
Characteristics of water and food supplies
Menu planning and stocking
Selection and design of equipment
Selection of energy sources
Issuing and inventories
Preparation, service, distribution and control
Sanitation and waste disposal
Environmental factors
Temperature and humidity
Odors and odor control
Lighting requirements, sources and schemes
Space arrangement, assignment and prediction

AD-403 823 Div. 29, 32
(TISTM/CCH) OTS price $2.25

Army Engineer Research and Development Labs., Fort Belvoir, Va.
INVESTIGATION OF LOW-COST SANITATION SYSTEMS.
Branch rept., 3 May-1 Nov 62,
by Paul E. Des Rosiers, Jr. 19 Nov 62, 77p.
Proj. 8A72 04 001 29
Unclassified report

Descriptors: *Waste (Sanitary engineering), *Chemical warfare agents, *Sanitary engineering, *Toilet facilities, *Radioactive waste, Shelters, Chemical reactions, Coagulation, Sedimentation, Chlorination, Oxidation-reduction reactions, Oxygen consumption, Disposal, Decontamination, Cost, Radioactive fallout.

An extensive survey of the literature for sanitation systems applicable to the treatment of human wastes in fallout shelters was made. Preliminary laboratory tests of various chemical agents were conducted to determine effectiveness for control of objectionable odors and to measure the bacteriocidal and bacteriostatic properties of the chemical agents. This report concludes that the sanitary vault concept has inherent advantages, and that the masking of odors is considered to be a poor method of odor control. A minimum air recirculation rate of 2 cubic feet per minute in the privy tested 30-inch x 36-inch x 81-inch is effective in controlling the level of odor. The process of defecation, including the associated release of flatus, results in the introduction into the atmosphere of malodorous substances. Chemical treatment of human wastes collected in open containers can effectively suppress odors. The dual-purpose container, with proper chemical treatment of waste, can serve as a suitable means for collecting and storing human excreta over a period of at least seven days with satisfactory odor control and suppression or destruction of some bacteria. (Author)

AD-403 866 Div. 29, 20
(TISTM/CCH) OTS price $1.60

Swift and Co., Chicago, Ill.
THE EFFECT OF STERILIZING AND SUB-STERILIZING DOSES OF CATHODE AND GAMMA RAYS ON THE PROPERTIES OF BEEF AND PORK.
Rept. no. 14 (Final), 6 Dec 54-1 Jan 62,
by F. L. Kauffman. 1 Jan 62, 16p.
Proj. 78401002 Unclassified report

Descriptors: *Beef, *Pork, *Preservation, Dose rate, Electron beams, Gamma rays, Acceptability, Measurement, Pasteurization, Radiation effects, Meats.

In research on the irradiation of beef and pork, both at sterilizing at pasteurizing levels, although bacterial population was reduced, the cooler shelf life of both pork and beef was not appreciably altered as compared with the control. A comparison was made wherein three different sources of radiation were used on beef steaks and pork chops at levels of 25,000 and 100,000 rads. Effects of sterilizing doses on pork and beef from a gamma source and an 8 million volt linear accelerator were compared initially and after one, three and six months storage at 45 F. statistical analysis of strip steak mean flavor scores indicated that the control steaks were significantly better in flavor ($p<0.01$) than the irradiated steaks at each storage time. The tenderness mean scores of the irradiated steaks were very significantly higher ($p<0.01$) than the control steaks. A study was made wherein beef steaks were broiled to an internal temperature between 125 F. and 180 F. prior to gamma irradiation at 2.8M and 4.6M rads. (Author)

AD-404 050 Div. 29
(TISTM/LMH) OTS price $2.60

6570th Aerospace Medical Research Labs., Aerospace Medical Div., Wright-Patterson Air Force Base, Ohio.
AEROSPACE FEEDING CONSOLE EVALUATION.
Rept. for 24 Apr-8 May 62,
by George W. Filson, Ralph E. Herbst, and Paul A. Lachance. Mar 63, 24p.
Proj. 6373, Task 637305
AMRL MM32

Unclassified report

Report on Equipment for Life Support in Aerospace

Descriptors: *Food, *Nutrition, Containers, Diet, Storage, Preparation, Acceptability, Food dispensing, Space flight.

A compact feeding console designed for storing, preparing, and dispensing food items in a space vehicle was evaluated during a simulated 3-man, 14-day space flight. The engineering design of the console and accessories were evaluated and the acceptability and nutritional value of the food recommended for use in the console were measured. Further research must be conducted to improve the designs incorporated in the console. Design should be compatible with the diet and type of processed food to be furnished the crewmembers (Author)

AD-404 090 Div. 29, 7, 28
(TISTB/AW) OTS price $7.60

Sanders and Thomas, Inc., Pottstown, Pa.
ILLUMINATION IN GROUP SHELTERS.
Final rept. pt. 1,
by Morell C. Smith and W. J. Wendel. Jan 63, 30p.
Contract OCD OS62 80

Unclassified report

Descriptors: *Shelters, Visual acuity, Costs, Standards, Lighting equipment, Propanes, Tests, Liquefied gases, Illumination.

The effects of low levels of illumination on visual acuity and on performance of simple tasks were studied in an effort to evaluate group shelter illumination requirements. The purely objective determination of a minimum level was negative. The characteristics of various illumination sources are compared. Based on test results and evaluation of the illumination sources, designs and costs for standardized shelter lighting packages are presented. (Author)

AD-404 091 Div. 29, 7, 28
(TISTB/AW) OTS price $2.60

Sanders and Thomas, Inc., Pottstown, Pa.
ILLUMINATION IN GROUP SHELTERS.
Final rept. pt. 2,
by Morell C. Smith. Mar 63, 16p.
Contract OCD OS62 80

Unclassified report

Descriptors: *Shelters, Mirrors, Solar radiation, Lighting equipment, Illumination.

A prototype light admitting device (LAD) was built and tested based on the arrangement suggested in Part I of this report. The test indicated that illumination of group shelters was feasible by this method during periods of sunlight. Illumination levels found by the test are given and various parameters of the use of LAD are discussed. Improvements in design based on experience with the prototype are also discussed. (Author)

30. RESEARCH AND RESEARCH EQUIPMENT

AD-403 591 Div. 30
(TISTA/GEC) OTS price $4.60

Stanford U., Calif.
A CENTRIFUGAL HYPERSONIC WIND TUNNEL FACILITY FOR INVESTIGATING EFFECTS OF INERTIA ON ABLATING BODIES,
by Joseph Scott Ford, II. Mar 63, 39p.
Contract Nonr22530
Unclassified report

Thesis.

Descriptors: *Hypersonic wind tunnel, Electric arcs, Wind tunnel nozzles, Heat exchangers, Cooling, Centrifuges, Ablation, Feasibility studies, Reentry vehicles, Deceleration, Atmosphere entry, Simulation, Descent trajectories, Design.

This paper draws attention to the significant effect of inertial loads experienced during reentry on the process of ablation. It examines the feasibility of creating a ground-test facility in which re-entry deceleration can be simulated in a high velocity, high enthalpy gas flow. The conclusion is reached that a centrifuge mounted, electric arc heated, hypersonic tunnel can be developed with the necessary capability for studies over a wind range of re-entry trajectories. The essentials of such a design are presented. (Author)

AD-403 649 Div. 30, 2
(TISTP/FR) OTS price $10.50

Texas A. and M. Coll., College Station.
AN AUTOMATIC MICROMETEOROLOGICAL DATA-COLLECTION STATION.
Final rept.,
by William H. Clayton. 28 Feb 63, 127p.
Contract AF19 604 6200, Proj. 7655, Task 765501
AFCRL 63 418 Unclassified report

Original contains color plates; all DDC reproductions will be in black and white. Original may be seen in DDC Hq.

Descriptors: *Weather stations, Meteorological instruments, Micrometeorology.

The design and operation of an automatic micrometeorological measuring station based on a prototype developed for use on Project Green Glow is reviewed. Full information in the form of description and schematic diagrams sufficient to permit duplication is provided. Also included is a summary of the data collected through 30 November 1962 on the Dallas Tower Network of which this station, located at the KRLD-WFAA television transmitter site near Cedar Hill, Texas, is Station A. (Author)

AD-403 667 Div. 30, 18
(TISTP/MH) OTS price $6.60

Coordinated Science Lab., U. of Illinois, Urbana.
(No title).
Progress rept. for Dec 62-Feb 63.
24 Apr 63, 54p.
Contract DA36 039TR US AMCO2208, DA Proj. 3A99 25 004
Unclassified report

Descriptors: *Research program administration, Gyroscopes, Vacuum apparatus, Digital computers, Artificial intelligence, Air traffic control, Adaptive control systems, Teaching machines, Automatic, Plasma physics, Superconductivity, Thin films.

Contents:
Electric Vacuum Gyroscope
Surface and Atomic Physics
  Pressure Shift of the Atomic Nitrogen Hyperfine Structure
Computer
  CSX-1 Computer
  CDC 1604 Computer
  Artificial Intelligence
  Air Traffic Control Studies
System Theory
PLATO (Automatic Teaching System)
Vacuum Instrumentation
Plasma Physics
High Magnetic Field Superconductors
Vacuum Electrical Breakdown
Physical Electronics
  Evaporated Thin Films
Arms Control and Disarmament Research

AD-403 701 Div. 30, 27
(TISTA/LSK) OTS price $3.50

Bolt, Beranek and Newman, Inc., Cambridge, Mass.
NOISE CONTROL FOR AIRCRAFT ENGINE TEST CELLS AND GROUND RUN-UP SUPPRESSORS. VOLUME 2: DESIGN AND PLANNING FOR NOISE CONTROL.
Final rept.,
by Norman Doelling and Richard H. Bolt. Nov 61, 192p.
Contracts AF33 616 3335 and AF33 616 3938, Proj. 7210, Task 71708
WADD TR58 202, vol. 2
Unclassified report

Report on the Generation, Propagation, Action and Control of Acoustic Energy.

Descriptors: *Jet engine noise, *Turbojet engines, *Test facilities, Attenuation, Acoustics, Design, Ground support equipment, Damping, Configuration, Reduction, Acoustic insulation.

This volume is the second in a series of three volumes (AD-403 712 and AD-403 730) on the physical aspects of noise control in aircraft engine test cells and ground run-up suppressors. This volume provides methods for planning and designing engine test cell facilities. Procedures are presented for determining noise reduction requirements of an aircraft engine test cell from the noise source characteristics, the acoustic criteria and the location. The reference test cell concept is used. Procedures for designing a facility to meet these noise reduction requirements are presented. The analysis and design of ground run-up noise suppressors are similarly treated, but in less detail. (Author)

AD-403 712 Div. 30, 27
(TISTA/LSK) OTS price $2.50

Kittell-Lacy, Inc., El Monte, Calif.
INFLUENCE OF NOISE CONTROL COMPONENTS AND STRUCTURES ON TURBOJET ENGINE TESTING AND AIRCRAFT GROUND OPERATION.
Final rept.,
by Bonard E. Morse. Dec 62, 98p.
Contract AF33 616 5789, Proj. 7231, Task 723104
ASD TDR62 134 Unclassified report

Report on Biomechanics of Aerospace Operations.

Descriptors: *Jet engine noise, *Turbojet engines, *Test facilities, Attenuation, Damping, Diffusers, Design, Ground support equipment, Configuration, Reduction, Test facilities, Acoustic insulation.

There has been a need for summarizing and establishing adequate aerodynamic and thermodynamic design criteria for turbojet engine test cells and ground run-up suppressors. These criteria are discussed and their uses are illustrated by examples of typical design problem solutions. The presence of noise suppression structures can have significant influences upon the operation of the turbojet engine. These influences are enumerated and evaluated with recommendations for establishing maximum acceptable effects. Typical test cell configurations are presented and design criteria are established for providing noise suppression facilities which may be utilized for testing a full size aircraft or an engine by itself. These facilities can be either permanent structures or portable units. (Author)

AD-403 730 Div. 30, 27
(TISTA/LSK) OTS price $2.50

Bolt, Beranek and Newman, Inc., Cambridge, Mass.
NOISE CONTROL FOR AIRCRAFT ENGINE TEST CELLS AND GROUND RUN-UP SUPPRESSORS. VOLUME 1: MEASUREMENT AND ANALYSIS OF ACOUSTICAL PERFORMANCE.
Final rept.,
by Norman Doelling and Richard H. Bolt. Nov 61, 99p.
Contracts AF33 616 3335 and AF33 616 3938, Proj. 7210, Task 71708
WADC TR58-202-V1 Unclassified report

Report on The Generation, Propagation, Action and Control of Acoustic Energy.

Descriptors: *Jet engine noise, *Turbojet engines, Acoustics, Test methods, Instrumentation, Intensity, Test equipment, Ground support equipment, Diffusers, Damping, Measurement, Test facilities.

This volume is the first in a series of three volumes (AD-403 701 and AD-403 712) concerned with the physical aspects of noise control in aircraft engine test cells and ground run-up suppressors. This volume presents recommended procedures for the measurement of noise control effectiveness. Three classes of measurement procedures are described. The first class is concerned with the description of the acoustical effectiveness of a facility as a whole. Such descriptions may be used to compare facilities with one another or to determine if a facility has met a given criterion. The second class of measurements is used to determine the most economical way of improving the noise control design of an existing facility. The third class of measurements is used to describe the acoustical effectiveness of individual noise control components. (Author)

AD-403 761 Div. 30
(TISTP/MFA) OTS price $1.60

Army Electronics Research and Development Agency, Fort Monmouth, N. J.
AN APPLICATION OF HEURISTIC PROGRAMMING TO THE PROBLEM OF THEOREM PROVING BY MACHINE,
by Serafino Amoroso. Mar 63, 16p.
Task 3A99 25 004 03
AELRDL TR2345
Unclassified report

Descriptors: *Communication theory, Functions, Mathematical logic, Digital computers, Dictionaries, Language, Vocabulary, Programming (Computers).

A mechanical procedure using trial and error techniques is outlined which will verify, in a large number of cases, the validity of an argument form expressed in quantification theory. Combinational processes were used to a minimum extent. Techniques of implementation for a digital computer are also discussed. (Author)

AD-403 787 Div. 30
(TISTP/FR) OTS price $3.60

Naval Civil Engineering Lab., Port Hueneme, Calif.
AN ION GUN FOR A TIME-OF-FLIGHT MASS SPECTROMETER,
by R. D. Hitchcock. 27 Feb 63, 33p. TN488
Proj. Y R011 01 023
Unclassified report

Descriptors: *Ion sources, Spectrum analyzers, Mass spectroscopy.

An ion gun was built for use in a proposed time-of-flight mass spectrometer. Details on the design and performance of the ion gun are given. Testing of the gun has shown that its sensitivity is 1/10 to the 14th power amp/micron of inlet pressure for an unchopped ion beam. At a chopping frequency of 1000 pps and a pulse width of 10 nanoseconds, the sensitivity would be large enough for an electron-multiplier ion detector. A mathematical analysis of the proposed TOF spectrometer is given. (Author)

AD-403 792 Div. 30
(TISTP/JEA) OTS price $11.50

Bureau of Naval Weapons, Navy Dept., Washington, D. C.
BUREAU OF NAVAL WEAPONS RESEARCH PROBLEMS.
June 62, 143p.
NAVWEPS 7682A, vol. 1
Unclassified report

Descriptors: *Antisubmarine warfare, *Aerial warfare, *Weapon systems, *Ground support equipment, *Antimissile defense systems, Research program administrations, Guided missiles, Guided missile components, Computers, Data processing systems, Navigation, Guidance, Aircraft, Ordnance, Underwater ordnance, Radar equipment, Hydraulic systems, Materials, Instrumentation, Naval research, Military requirements.

The technical problems of a broad area of needs in many scientific and engineering fields were presented. Each problem was one in which the Bureau of Naval Weapons actively is seeking a solution. In making these research needs known to Industry, the Bureau of Naval Weapons hopes to learn of new developments and problem solutions which may exist but of which the Bureau was not aware. Despite extensive research programs within the Bureau establishment, there was a continuing need for fresh approaches, ideas, and techniques which may lead to superior aircraft and weapons. The information was intended to stimulate research and development based on the requirement that solutions to the problems were needed for the defense of our nation. (Author)

AD-403 867 Div. 30, 12, 8
(TISTE/CRJ) OTS price $4.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
A MAGNETIC REVERSIBLE COUNTER WITH DIGITAL-TO-ANALOG CONVERSION.
by Larry M. Cohen. Apr 63, 1v. 6 90 63 29
Unclassified report

Report on Physical Electronics.

Descriptors: *Flight control systems, *Digital-to-analog converters, Reliability (Electronics), Counting methods, Gases (Circuits), Alternating circuit, Computer logic, Errors, Trigger circuits, Magnetic cores, Oscillators, Ground support equipment, Transistors, Feedback, Guided missiles.

A time-shared, two-channel magnetic counter and digital-to-analog converter is described. The counter is capable of performing unit addition and subtraction. The design objective - to reduce the number of components - was well satisfied by the use of all-magnetic shift registers as the storage elements. Only two components are required for magnetic storage, whereas ten components were required for transistor flip-flop storage. The logic operations were performed by time-shared diode gate circuits. The calculated worst-case error for the digital-to-analog conversion is + or - 0.3%. The measured error is less than + or - 0.25%. This error is due to variations in the bulk resistivity of diodes and PNPN switches, and it can be reduced, theoretically, to less than + or - 0.1%. (Author)

AD-403 878 Div. 30
(TISTP/FR) OTS price $5.60

New York U. Coll. of Engineering, N. Y.
GROUND BASED RAINDROP SPECTROMETER.
Final rept.,
by A. M. Nathan, Leon Bennett, and C. J. Makris.
Feb 62, 43p. 788
Contract DA36 039sc84970
Unclassified report

Descriptors: *Raindrops, Counting methods, Instrumentation, Photomultipliers, Data

storage systems, Punched tape, Meters.

A novel ground-based raindrop spectrometer is described and its operating principles explained. The instrument is designed to count and size automatically all raindrops falling freely through an optically defined sampling area of 32 sq. cm. All drops larger than 0.2 mm in diameter are counted and assigned to the appropriate one of 13 size intervals, the last interval being drops larger than 4.6 mm. The running total count of drops in each size interval is accumulated in an electronic memory for a time interval which can be preset to any duration from 5 sec to 3 min. Then the stored counts are read out automatically and recorded on a paper tape punch in seconds, after which the memory clears and data accumulation begins again. The instrument can store up to 10,000 counts in each of the 13 size intervals during each data collection period. From the record, the following information can be derived: raindrop size spectra as a function of time, average volume drop radius, total rainfall or rainfall rate. (Author)

AD-404 016 Div. 30
(TISTP/JW) OTS price $12.50

California U., Los Angeles.
INVESTIGATION IN DIGITAL TECHNOLOGY RESEARCH.
Annual summary rept., 1 June 61-31 May 62,
by M. Aoki, B. Bussell, G. Estrin, C. T. Leondes, J. Bibb and others. Jan 63, 171p. 62 64
Contract Nonr2352
Unclassified report

Descriptors: *Digital systems, *Control systems, Digital computers, Pattern recognition, Heat transfer, Automation, Thin films, Scientific research, Design.

Contents: Organization and command structure for content-addressable memory systems; Assignment problems; Two-dimensional heat conduction problem; Pattern recognitions; General discussion and review of automatic pattern recognition; The conditional uncertainity criterion for cell significance; Thin film studies; and Optimization studies.

AD-404 160 Div. 30
(TISTP/WH) OTS price $3.60

Hughes Tool Co., Culver City, Calif.
(No title).
Monthly progress rept. no. 6, 1-28 Apr 63,
I. Terris. 29 Apr 63, 34p.
Contract AF04 695 210
Unclassified report

Descriptors: *Redundant components, *Digital computers, Reliability, Computer logic.

Within the quest for more reliable digital computers, it is desired to examine machines which possess higher reliability by virtue of their ability to operate after permanent failures have occurred. This ability could be possessed by machines which have the ability to properly evaluate seemingly wrong results (by program methods), by building machines with redundant parts, by machines which have self-reorganizing capability, or by unknown and unspecified methods. As used herein, the expression 'self-reorganizing machines' denotes machines which have a minimum of redundancy and, thus, recover from a failure by, wherever possible, excluding failed equipments from the paths of information flow or replacing them with equipments which had nonessential roles in the machine's organization, rather than replacing the failed equipments with redundant units. (Author)

AD-404 179 Div. 30
(TISTE/JWS) OTS price $7.60

Electronic Systems Lab., Mass. Inst. of Tech., Cambridge.
APPLICATION STUDIES OF COMBINED ANALOG-DIGITAL-COMPUTATION TECHNIQUES,
by Frank B. Hills. Feb 63, 66p. FR 165
Contract AF19 604 6654, Proj. 4641, Task 464102
AFCRL 63 72 Unclassified report

Descriptors: *Analog-digital computers, Pulse modulation, Computer logic, Computer storage devices, Partial differential equations, Speech representation, Stereoscopic display systems, Spectrum analyzers, Filters (Electromagnetic wave), Polynomials, Programming (Computers).

The concept of pulsed-analog computation in which high-speed, time-shared analog computing elements operate under the control of a digital computer is described. The design of a demonstration pulsed-analog computer is presented and applicability of combined analog-digital computation techniques to some computational tasks. The computation tasks were those for which it was felt that combined analog-digital techniques would provide some advantages over purely analog

or purely digital techniques. The computational tasks were: (1) the solution of partial differential equations -- here the studies indicated that combined analog-digital techniques can provide enough saving in computation time and computer hardware to make them useful in the control of chemical processes; (2) speech synthesis -- these studies indicated that a general-purpose combined analog-digital computer can be a very useful research tool where flexibility in the model of the system under study and the control parameters of that model is desired; and (3) digital computer cathode-ray tube display -- here the studies indicated that a fairly simple pulsed-analog computer can remove from the digital computer the time-consuming task of generating displays of the line drawing type and perform other tasks. (Author)

AD-404 188 Div. 30
(TISTM/LMH) OTS price $3.60

Ballistic Research Labs., Aberdeen Proving Ground, Md.
A PHOTOGRAMMETRIC METHOD FOR DETERMINING THE TOPOGRAPHY OF LIQUID SURFACES,
by Heinz G. Poetzschke and Donald F. Menne.
Mar 63, 38p.
Proj. 1M222901A215
BRL 1196

Unclassified report

Descriptors: *Liquid level control, Photogrammetry, Fuel gages, Topographic cameras, Fluid flow, Pressure gages, Analog computers, Gas turbines, Fuels.

A stereophotogrammetric method was developed for the determination of the topography of liquid surfaces, which serve as an analogue for gas pressures and velocities in the evaluation of turbine performance. An instrumentation system has been constructed, consisting of two modified Wild RC-7 cameras with microflash projection of a random pattern of spots to identify the water table surface. The reduction of the data was accomplished by both analogue and analytical methods. The analogue method, including automatic plotting, was the more economical and yielded an accuracy of ±120 microns. The analytical method, involving manual plotting, resulted in an overall accuracy of ±60 microns, and an accuracy of ±30 microns for small areas near the center. (Author)

AD-404 199 Div. 30, 12
(TISTP/FR) OTS price $2.60

Aerospace Corp., Los Angeles, Calif.
SATELLITE CONTROL FACILITY EQUIPMENT AUGMENTATION. DESIGN CRITERA: SATELLITE TEST ANNEX DATA SUBSYSTEM.
31 Aug 62, 17p. TOR169 3110 2
Contracts AF04 647 930 and AF04 695 169

Unclassified report

Descriptors: *Data processing systems, Digital computers, Data storage systems, Data transmission systems, Telemetering data, Satellites (Artificial), Tracking.

Design criteria are given for augmentation and reconfiguration of the data-handling equipment of the Satellite Test Annex (STA) under the Augmentation Program. They are an amplification of the STA portion of the Design Criteria for the Data Subsystem of the Satellite Control Facility (SCF) described in Appendix G of Aerospace Report No. TOR-930(2110)-1. The data subsystem described supports the satellite control, acquisition, tracking, commanding, telemetry, and STA control operations as required for each applicable project. It will be integrated with the timing subsystem, control control consoles, and the inter- and intra-facility communications subsystems. (Author)

AD-404 214 Div. 30
(TISTP/FR) OTS price $3.60

Texas A. and M. Coll., College Station.
INFLUENCE OF VERTICAL MOTION ON THE SAVONIUS ROTOR CURRENT METER,
by Roy D. Gaul. 1 Feb 63, 29p. R63 4T
Proj. 329

Unclassified report

Descriptors: *Meters, Ocean currents, Tests, Calibration.

Contents:
Introduction
The test facility
Experimental models
Threshold
Steady state calibration
Influence of stand-off rods
Influence of tilt
Surface roughness
Response
Influence of vertical motion
Conclusions

AD-404 285 Div. 30, 8
(TISTA/LSK) OTS price $1.10

General Electric Co., Utica, N. Y.
QRC-139A AEROSPACE GROUND EQUIPMENT (AGE) AND QRC-139A-(T) AGE EQUIPMENT.
Monthly progress rept. no. 14, 9 Apr-9 May 63, 13 May 63, 7p.
Contracts AF33 604 39443 and AF09 603 41935

Unclassified report

Descriptors: *Radar transmitters, *Spectrum analyzers, Radar jamming, Broadband, Frequency shift converters, S band, L band, Humidity, Radio interference, Ground support equipmnent, Environmental tests, Test sets.

A description is presented of work accomplished on the design, development and First Article (qualification) testing of a Broadband Spectrum Analyzer, Converter-Measuring Frequency 'S', and Converter-Measuring Frequency 'L'. (Author)

AD-404 382 Div. 30
(TISTE/JWS) OTS price $7.60

Houston Engineering Research Corp., Texas.
EVALUATION AND MODIFICATION OF EXISTING PROTOTYPE DYNAMIC CALIBRATION SYSTEM FOR PRESSURE-MEASURING TRANSDUCERS. VOLUME I. TECHNICAL RESULTS.
Final technical rept.,
by Joseph L. Schweppe, James L. Williams, Arthur H. McMorris, and W. Ray Busby. Mar 63, 70p.
Contract AF04 611 8199, Proj. 3850BPSN3850
Task 38506
RTD TDR63 9, v. 1

Unclassified report

Descriptors: *Pressure gages, *Transducers, *Digital computers, Shock tubes, Analog to digital converters, Punched cards, Photographic images, Cameras, Frequency, Test methods, Calibration, Programming (Computer).

The work was undertaken with six specific goals: (1) to evaluate the pressure transducer calibra-

tion facility at Edwards Air Force Base, (2) to determine what minor and major modifications were required to provide a highly accurate calibration system with an output compatible with IBM data processing formats, (3) to make approved minor modifications and test the resulting system, (4) to find and justify rigorous mathematical methods for determining the dynamic characteristics of a pressure transducer based on information obtained from transient response measurements, (5) to find and justify rigorous mathematical methods for determining the input function to a transducer based on the output data and the dynamic characteristics, and (6) to develop computer programs to perform the computations for each mathematical method. Volume I of this report summarized the results of the entire program and presents both conclusions and recommendations for future work. (Author)

AD-404 383 Div. 30
(TISTE/JWS) OTS price $3.60

Houston Engineering Research Corp., Tex.
EVALUATION AND MODIFICATION OF EXISTING PROTOTYPE DYNAMIC CALIBRATION SYSTEM FOR PRESSURE-MEASURING TRANSDUCERS. VOLUME III. COMPUTER PROGRAMS.
Final technical rept.,
by J. L. Schweppe, J. L. Williams, A. H. McMorris, and W. R. Busby. Mar 63, 33p.
Contract AF04 611 8199, Proj. 3850BPSN3850, Task 38506
RTD TDR63 9, vol. 3 Unclassified report

Descriptors: *Pressure gages, *Transducers, *Digital computers, Punched cards, Programming languages, Photographic images, Data processing systems, Calibration, Programming (Computers).

The Transfer Function Approximation Program (TFAP) is an IBM 7909 FORTRAN program which will compute the approximate transfer function for any linear pressure transducer system from the system's time response to a step input. Input data to the program contains information which specifies test conditions, information which defines the data range and density for the approximation, and information which specifies the amplitude of the time response at each of a number of equally spaced sample points in the time domain. Primary output data from the program contains the amplitude and phase of the approximate transfer function for the transducer system at equally spaced points in the frequency domain. With minor modifications, the program is adaptable to any problem which requires the computation of a linear system's transfer function from its time response to a known input. The program has been tested with time response data for an analytically known two degree-of-freedom system excited by a step input. The results of these tests indicate that the accuracy of the approximate transfer function is determined by the data sampling frequency and the data range. For sampling frequencies greater than twenty times the highest frequency of interest and a data range which includes the time response out to a point at which the time response has reached 99% of its final value, the approximate transfer function was found to be within .5% of its known value. (Author)

AD-404 384 Div. 30
(TISTE/JWS) OTS price $3.60

Houston Engineering Research Corp., Houston, Texas.
EVALUATION AND MODIFICATION OF EXISTING PROTOTYPE DYNAMIC CALIBRATION SYSTEM FOR PRESSURE-MEASURING TRANSDUCERS. VOLUME II. OPERATING PROCEDURES.
Final technical rept.,
by J. L. Schweppe, J. L. Williams, A. H. McMorris, and W. R. Busby. Mar 63, 29p.
Contract AF04 611 8199, Proj. 3850BPSN3850, Task 38506
RTD TDR63 9, vol. 2 Unclassified report

Descriptors: *Pressure gages, *Transducers, Shock tubes, Test equipment (Electronics), Test methods, Cameras, Analog-to-digital converters, Frequency, Piezoelectric transducers, Strain gages, Calibration.

The equipment used in the Edwards AFB Dynamic Calibration Facility is described. The report explains the dynamic calibration procedure and gives detailed equipment operating instructions. A shock tube is used to excite the transducer under test. A flow diagram and detailed explanation of shock tube utilization is presented. The data recording system is diagrammed, in correct operating arrangement. In this group of equipment there are two blast velocity gages which are used to measure the velocity of the shock wave. These gages are placed in ports on top of the shock tube in the test section. The leads from the blast velocity gages are connected to a Berkeley time interval meter. The electrical pulse from either one or the other of the blast velocity gages is also used to trigger the oscilloscope sweep. A Polaroid camera is used to photograph the test transducers output on the scope screen. The Flying Spot Analog-to-Digital Converter reads the transducer response as recorded on a photographic transparency and converts the film record to digital form. The digital information is recorded on IBM cards and/or printed paper tape. Output data rate is 40 cards per minute when punching cards and a maximum of 300 points per minute otherwise. (Author)

AD-404 385 Div. 30
(TISTP/JEA) OTS price $4.60

ITT International Electric Corp., Paramus, N. J.
STRATEGIC AIR COMMAND CONTROL SYSTEM (465L).
Monthly test progress rept. 21 Jan-20 Feb 63.
20 Mar 63, 42p. 20130; 20
Contract AF19 626 8
ESD TDR63 301 Unclassified report

Descriptors: *Strategic Air Command, *Data processing systems, Data transmission systems, Checkout equipment, Operation, Test methods, Display systems, Communication systems, Data storage systems, Reliability, Programming (Computers), Control systems.

Information on testing the 465L System for the time period from 21 January to 20 February 1963 is presented. Information is reported for milestones in the 465L System Test Plan; these milestones were grouped by centrals and other titles, and then further organized according to subsystems and comparable collective designations. The testing activities which were not attributable to any of the milestones prescribed in the System Test Plan are described in paragraphs associated with related testing activities. Observed problems are highlighted for information and possible aid. The System Test Facility (STF) is used effectively for demonstrations, simulated tests, and real tests on equipment installed in the STF. Data from these tests are used in plans for the 465L System. Activities grouped under the Data Transmission Subsystem include the following: On-site checkout of the EDTCC at Offutt is under way; two EDLCC's are almost ready for on-site checkout; on-site acceptance testing was completed on eight RCC's; and portions of the Data Transmission Subsystem Integration Test Specification are submitted. (Author)

Division 30 - RESEARCH AND RESEARCH EQUIPMENT

AD-404 515 Div. 30
(TISTE/JBM) OTS price $8.10

Naval Research Lab., Washington, D. C.
1962 ANNUAL REPORT.
1962, 79p.
Unclassified report

Descriptors: *Naval research, *Scientific research, *Naval research laboratories, Astrophysics, Metallurgy, Astronomy, Mechanics, Chemistry, Optics, Solid state physics, Radio communications systems, Electronics, Nuclear physics, Oceanology, Sound.

Unclassified technical accomplishments of the U. S. Naval Research Laboratory during the Calendar Year 1962 are reported. This report should serve to give those who are unfamiliar with the Laboratory a general concept of NRL's varied activities and capabilities. There are, as of the close of the year, some 375 research problems listed as current and active. They vary from long-term basic investigations to short-term evaluations of particular devices or concepts. To attempt to measure progress on all of these would be tedious to catalog and onerous to review. The endeavor has been, to select a few outstanding projects in each of NRL's twelve fields of research effort and to describe these as examples of the kind of work being done in each field. (Author)

AD-404 577 Div. 30, 17, 14
(TISTM/PCR) OTS price $8.10

General Electric Co., Cincinnati, Ohio.
RESEARCH AND EVALUATION OF MATERIALS FOR THERMOCOUPLE APPLICATION SUITABLE FOR TEMPERATURE MEASUREMENTS UP TO 4500 F ON THE SURFACE OF GLIDE RE-ENTRY VEHICLES.
Rept., 15 Mar 62-15 Mar 63,
by W. C. Kuhlman. May 63, 75p.
Contract AF33 657 8472, Proj. 7351, Task 735101
ASD TDR63 233
Unclassified report

Report on Metallic Materials.

Descriptors: *Thermocouples, *Heat-resistant metals and alloys, Boron compounds, Boost-glide vehicles, Test facilities, Furnaces, Laboratory furnaces, Induction heating, Tungsten, Tungsten alloys, Brittleness, Thermoelectricity, Melting, Ductility, Electric insulation, Resistance (Electrical), Zirconates, Manufacturing methods, Iridium alloys, Osmium alloys, Rhenium alloys, Rare earth compounds, Oxides, Ruthenium alloys, Rhodium alloys, Platinum alloys, Molybdenum alloys, Beryllium compounds, Thorium compounds, Hafnium compounds, Materials, High temperature research.

The thermoelectric output versus temperature of a W/W - 26Re thermocouple was measured to 5800 F. Thermoelectric sensitivity was relatively high over the entire temperature range. Thermoelectric output on new thermocouple systems versus temperature was also measured with respect to W - 26Re commercial wire for Re, Re - 6W, Re - 9W, Re - 12W, Re - 15W, Re - 10Ru, Re - 5Ru, Re - 10Rh, Re - 20Rh, Re - 10Pt, Re - 30Ir, Re - 5Mo, Re - 100s, Re - 200s, Mo, Mo - 10W, Mo - 20W, Mo - 10Re, Ir - 20Re alloy materials. Of the alloys studied, Re - 10Ru and Re - 12W show the greatest potential for high-temperature thermocouple application. The oxides, BeO, ThO2, and HfO2, are compared as electrical insulators. Beryllia is best, but with proper geometry ThO2 and HfO2 would also be satisfactory. (Author)

AD-404 591 Div. 30, 5, 12
(TISTE/OHD) OTS price $1.60

System Development Corp., Santa Monica, Calif.
1604-PICE SIMULATION PROGRAM OPERATING INSTRUCTIONS (MILESTONE VII) DATA REDUCTION AND OUTPUT PROCESSING SYSTEM,
by P.-T. Kastama. 31 Oct 62, 10p. TM L734 011 00
Contract AF04 695 40
Unclassified report

Descriptors: *Programming (Computers), *Satellite networks, *Instruction manuals, Data processing systems, Punched cards, Input-output devices.

Reports that the data reduction and output processing system is used to process the input/output tapes written by SIPS (simulated input preparation system) and IOSIM in the 1604-PICE simulation system and lists them in a readable and meaningful format with identifying information. (Author)

AD-404 619 Div. 30
(TISTM/AW) OTS price $8.10

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
AN EVAPORATING FILM CALORIMETRIC ENTHALPY PROBE,
by F. C. Haas. Feb 63, 80p.
Contract AF33 657 7774, Proj. 7063, Task 7063 01
ARL 63 47 Unclassified report

Descriptors: *Enthalpy, *High-temperature research, Gases, Film cooling, Instrumentation, Determination, Measurement, Calorimeters.

A calorimetric enthalpy probe of small size, capable of continuous operation in a high temperature, high heat flux environment, such as an arc, is described. The instrument operates by removing a sample from a hot gas stream and cooling it by evaporative film cooling until the temperature of the gas sample is low enough for measurement by conventional means. The composition of the cooled gas sample is measured and the total enthalpy of the hot gas entering the instrument is determined by an energy balance technique. The structure of the instrument may be maintained at a tolerable temperature level by forced convective cooling or by evaporative film cooling. The instrument has been compared for accuracy with gas temperature measurements made by conventional techniques at temperatures between 2100 and 4300 R. These tests, using nitrogen as the test gas and water as the evaporative coolant, have shown an average deviation of 2.3% between the methods of measurement. An instrument with an outside diameter of 0.1 in. has been fabricated and tested. This instrument is designed to measure an enthalpy of 15,000 Btu/#. To complement the enthalpy determination instrument, an instrument for continuous measurement of the gas-sample composition has been developed. (Author)

AD-404 653 Div. 30, 25
(TISTP/FEM) OTS price $2.00

Naval Research Lab., Washington, D. C.
A COLLECTION OF FORTRAN PROGRAMS FOR CRYSTAL STRUCTURE ANALYSIS,
by H. G. Norment. 29 Apr 63, 71p.
NRL 5885
Unclassified report

Descriptors: *Programming (Computers), *Crystal structure, Digital computers, Least squares method, Input-output devices, Punched cards, Data, Crystals, Control sequences, Mathematical analysis, X-ray diffraction analysis, Programming languages.

Descriptions and operating instructions for a collection of general utility programs applicable to various phases of crystal structure analysis with computers are presented. All coding is done in FORTRAN II language for 32K core IBM 704 and 7090 machines. The data input to many of the programs has been designed to be compatible with the output of the automatic data reduction program XRDDR (H. G. Norment, An X-Ray Diffraction Data Reduction Program for the IBM 704 and 7090, NRL Report 5739, Feb. 1962). Where data input from special tape is required, the logical tape numbers are assigned symbolic designations near the beginnings of the FORTRAN programs. Thus, if it is required that these tape numbers be changed, it is sufficient to change only the one FORTRAN statement card and then recompile. In the form presented in this report, the programs are written for use with the IBM 7090 IB Monitor system. (Author)

AD-404 654 Div. 30
(TISTP/JW) OTS price $1.10

System Development Corp., Santa Monica, Calif.
MODIFICATION TO COPII FOR 12XX,
by Billie Rhae Pruett and J. B. Munson. 5 Nov 62, 4p. TM786 000 00
Contract AF04 695 40

Unclassified report

Descriptors: *Programming (Computers). Control sequences, Magnetic tape, Data processing systems, Satellite networks, Display systems.

Lockheed Missiles and Space Corporation (LMSC) has the integration responsibility for the 12XX flight series. When System Development Corporation becomes responsible for the 12XX series, it will be converted to the COPII (Control for Operational Programs) System. Outlines features in the 12XX COP that must be integrated into the COPII System. (Author)

AD-404 656 Div. 30
(TISTE/JWS) OTS price $4.60

Kiruna Geophysical Observatory (Sweden).
AUDIO- AND SUBAUDIO-FREQUENCY ELECTROMAGNETIC RADIATION AT HIGH LATITUDE.
Final rept.,
by Alv Egeland, Sven Olsen, and Georg Gustafsson. 25 Mar 63, 24p.
Contract AF61 052 600, Task 1 and 2
AFCRL 63 475

Unclassified report

Descriptors: *Electromagnetic waves, *Audio-frequency, Background, Spectrum analyzers, Extremely low frequency, Radio interference, Very low frequency, Temperature, Antennas, Radio receivers, High altitude, Measurement.

Fluctuations in the audio- and subaudio-frequency range have been extensively studied. I-Band emissions at gyro frequencies of ionospheric ions and hiss frequencies as well as many emission bands, which are quite distinct from the normal back-ground-signals and are obtained as strong enhancements in portions of the spectrum, have been recorded. These latter observations, with special emphasis on the 700 cps emission band, are reported and discussed. All the emissions at 700 cps are probably caused by the same physical process or processes. It is considered probable that these emissions consist of electromagnetic radiation which is propagated in the extraordinary mode along the lines of force of the earth's magnetic field. The hypothesis that the 700 cps signals are generated outside the E-layer, by the arrival of protons is discussed. (Author)

AD-404 657 Div. 30
(TISTP/FEM) OTS price $1.10

System Development Corp., Santa Monica, Calif.
COPII CORE ALLOCATION,
by B. H. Pruett and J. B. Munson. 30 Oct 62, 3p.
TM782 000 00
Contract AF04 695 40

Unclassified report

Descriptors: *Data storage systems, *Computer storage devices, Programming (Computers), Control sequences, Satellite networks, Magnetic core storage, Magnetic cores.

The upper portion of core from approximately 75400B to 77777B is now used by the COPII (Control for Operational Programs) System for the directory and other tables. Some functions in the system either require all of core from 10000B to 77777B or are very close to requiring the area now used for the directory. (Author)

AD-404 658 Div. 30, 12
(TISTP/FEM) OTS price $2.60

System Development Corp., Santa Monica, Calif.
1604 SIMULATION PROGRAM DESCRIPTIONS. MILESTONE 11, TRACKING DATA PAPER TAPE GENERATION ROUTINE (SRADTPE),
by P. T. Kastama. 15 Mar 63, 23p. TM L734 037 00
Contract AF19 628 1648

Unclassified report

Descriptors: *Digital computers, *Data processing systems, *Programming (Computers), Telemetering antennas, Satellites (Artificial), Tracked vehicles, Input-output devices, Control sequences, Data storage systems, Satellite networks, Tracking, Simulation.

SRADTPE (Tracking Data Paper Tape Generation Routine) provides a simulation capability, which will produce tracking data on paper tape for unaugmented tracking stations. These data are intended to represent the actual data generated by various antennas during vehicle pass-over for a given station, vehicle, and revolution number. (Author)

AD-404 689 Div. 30
(TISTP/WH) OTS price $1.10

System Development Corp., Santa Monica, Calif.
1604 SIMULATION PROGRAM DESCRIPTIONS. MILESTONE 11. SIMULATION RESET ROUTINE (SIMRESET).
by P. T. Kastama. 22 Mar 63, 5p. TM L734 029 00
Contract AF19 628 1648

Unclassified report

Descriptors: *Programming (Computers). *Simulation.

SIMRESET (Simulation Reset Routine) will read a Reset Tape on one tape unit. However, SIMRESET will not check for record length errors. SIMRESET is a special purpose modification utilized by the simulation programs. (Author)

AD-404 691 Div. 30
(TISTP/JW) OTS price $1.10

System Development Corp., Santa Monica, Calif.
1604 SIMULATION PROGRAM DESCRIPTIONS. MILESTONE 11. SIPSA TABLES AND STORES,
by J. D. Solomon. 18 Mar 63, 4p. TM L734 030 00
Contract AF19 628 1648

Unclassified report

Descriptors: *Programming (Computers), *Satellite networks, Tracking, Data processing systems, Input-output devices.

Identifies the subroutines used for SIPSA (Simulated Input Preparation System for Augmentation) Tables and Stores. (Author)

AD-404 692 Div. 30
(TISTP/WH) OTS price $8.10

System Development Corp., Santa Monica, Calif.
COMPUTER PROGRAM ACCEPTANCE SPECIFICATIONS FOR THE 1164 FLIGHT SUPPORT TAPE MILESTONE 6,
by T. D. Court and G. B. Dant. 8 Mar 63, 83p.
TM L 1080 000 00
Contract AF19 628 1648
Unclassified report

Descriptors: *Digital computers, *Programming (Computers), *Magnetic tape, Satellites (Artificial).

This report supersedes TM(L)-1023/000/00. A series is presented of validation and acceptance tests designed to show the capability of the 1164 Flight Support Tape in performing functions required to support a satellite under a set of given conditions. (Author)

AD-404 693 Div. 30
(TISTP/JW) OTS price $1.10

System Development Corp., Santa Monica, Calif.
1604 SIMULATION PROGRAM DESCRIPTIONS MILESTONE 11, TRACKING REPORT PROCESSOR FOR AUGMENTATION (STRK),
by J. D. Solomon. 13 Mar 63, TM L734 021 00
Contract AF19 628 1648
Unclassified report

Descriptors: *Programming (Computers), *Satellite networks, Tracking, Data processing systems, Input-output devices.

STRK (Tracking Report Processor for Augmentation) is used to output tracking reports previously generated and recorded on magnetic tape by the SIPSA (Simulated Input Preparation System for Augmentation) system. Data are processed for the VERLORT, TLM18, Angle Tracker, TELDATA, PRELORT, and Disk-on-Rod antennas. (Author)

AD-404 694 Div. 30
(TISTP/JW) OTS price $3.60

System Development Corp., Santa Monica, Calif.
COMPUTER PROGRAM ACCEPTANCE SPECIFICATIONS FOR THE 1161 FLIGHT SUPPORT TAPE MILESTONE 6,
by T. D. Court and G. B. Dant. 10 Apr 63, 86p.
TM L1080 000 00A
Contract AF19 628 1648
Unclassified report

Descriptors: *Data processing systems, Programming (Computers), Satellite networks, Tracking, Specifications.

This report presents modification pages for TM L1080 000 00, 'Computer Program Acceptance Specifications for the 1164 Flight Support Tape Milestone 6,' dated 8 March 1963. (Author)

AD-404 695 Div. 30, 8, 18
(TISTP/JW) OTS price $1.10

System Development Corp., Santa Monica, Calif.
SAGE UNIQUE-TO-SITE ENVIRONMENTAL DATA AND EQUIPMENT ASSIGNMENTS MINOT ADS,
by D. M. McDaniel. 22 Mar 63, 5p.
TM ADC820 293 00A
Contract AF19 628 1648
Unclassified report

Descriptors: *Air control centers, *Early warning systems, Air Defense Command, Anti-aircraft defense systems.

AD-404 696 Div. 30, 8, 18
(TISTP/JW) OTS price $1.60

System Development Corp., Santa Monica, Calif.
SAGE UNIQUE-TO-SITE ENVIRONMENTAL DATA AND EQUIPMENT ASSIGNMENTS, PORTLAND ADS,
by D. M. McDaniel. 9 Apr 63, 15p.
TM ADC820 252 00A
Contract AF19 628 1648
Unclassified report

Descriptors: *Air control centers, *Early warning systems, Air Defense Command, Anti-aircraft defense systems.

Presents change pages for TM(ADC)-820/252/00, 'SAGE Unique-to-Site Environmental Data and Equipment Assignments - Portland ADS,' dated 15 October 1962 are presented. (Author)

AD-404 697 Div. 30, 8, 18
(TISTP/JW) OTS price $1.60

System Development Corp., Santa Monica, Calif.
SAGE UNIQUE-TO-SITE ENVIRONMENTAL DATA AND EQUIPMENT ASSIGNMENTS SPOKANE ADS,
by D. M. McDaniel. 15 Oct 62, 18p. TM ADC820 253 00
Contract AF19 628 1648
Unclassified report

Descriptors: *Air control centers, *Early warning systems, Air Defense Command, Anti-aircraft defense systems.

Contains the official SAGE unique-to-site environmental data and equipment assignments to be used in adapting the Model 9 computer programs and in Simplex Data Distribution Unit terminal assignments for the Spokane Air Defense Sector. (Author)

AD-404 699 Div. 30
(TISTE/OHD) OTS price $1.10

System Development Corp., Santa Monica, Calif.
INSTRUCTOR'S GUIDE FOR THE AN/FSQ-7,
by R. J. Gilinsky, M. E. Olson, and D. E. Reilly. 20 Mar 63, 3p. TM1118 001 00
Unclassified report

Descriptors: *Programming (Computers), Indexes, Training.

The purpose of this document is to present in organized fashion the necessary tools, excluding textual material, for a 4-week course in Q-7 coding. Because of the nature of the material, each volume is published separately. They are as follows: TM-1118/001/00 - Introduction; TM-1118/002/00 - Outline/Bibliography; TM-1118/003/00 - Problem Set; TM-1118/004/00 - Problem Solutions; TM-1118/005/00 - Examinations, P.A.T.s (Programming Aptitude Tests); and TM-1118/006/00 - Class Problem. Volumes 2, 3, and 6 can be given to the students along with the documents listed in the bibliography. Volumes 4 and 5 must obviously be restricted, and are published in limited form. The course as outlined in Volume 2 has been classroom tested, and the order of presentation has proven to be

satisfactory. Specific areas may be modified to suit individual tastes without altering the course as a whole. Discretion must be exercised in doing so, however, because the problem sets and exams presuppose use of the outlined chronology. (Author)

31. SHIPS AND MARINE EQUIPMENT

AD-403 660 Div. 31
(TISTE/CRJ) OTS price $2.60

David Taylor Model Basin, Washington, D. C.
SMOOTH-WATER TESTS OF MODEL 4943 REPRESENTING A 41-FOOT PERSONNEL BOAT,
by Kenneth H. Harbaugh. Apr 63, 22p.
Proj. S-F014-02-02
DTMB 1735
Unclassified report

Descriptors: *Boats, Hydrodynamics, Ship models, Ship hulls, Weight, Model tests.

Tests, using TMB Model 4943, were conducted in Langley Tank No. 1 to determine the performance characteristics of a round bilge 41-ft personnel boat. Model resistance, trim, wetted length, and CG rise were measured throughout the speed range for a number of hull loadings, initial trim conditions, and appendage configurations. Comparisons are made with the design condition. Results are presented in dimensionless form. (Author)

AD-404 299 Div. 31
(TISTE/JBM) OTS price $1.10

Portsmouth Naval Shipyard, N. H.
REPORTS ON VIBRATION SURVEYS ANNUAL SUBMISSION.
Apr 63, 1p.
BUSHIPS 9400 2
Unclassified report

Descriptors: *Nuclear-powered vessels, *Submarines, Acoustic impedance, Sonar ions, Ship auxiliary equipment.

32. MISCELLANEOUS ARTS AND SCIENCES

AD-403 518 Div. 32, 30
(TISTB/AW) OTS price $4.00

National Science Foundation, Washington, D. C.
CURRENT RESEARCH AND DEVELOPMENT IN SCIENTIFIC DOCUMENTATION NO. 11.
Nov 62, 1v.
NSF 63 5
Unclassified report

Descriptors: *Documentation, *Information retrieval, *Machine translation, Universities, Scientific organizations, Pattern recognition, Speech, Language, Artificial intelligence, Analysis, Scientific research.

This is the eleventh in a series of descriptive reports on current research and development in scientific documentation. All pertinent activities in the United States and abroad that have come to the attention of the Foundation staff are included under 5 major headings: information needs and uses, information storage and retrieval, mechanical translation, equipment, and potentially related research. This issue includes 423 statements describing over 500 research projects, studies, and experiments in 264 organizations. The research efforts of 84 organizations in 23 foreign countries are described in a total of 112 statements. (Author)

AD-403 815 Div. 32
(TISTB/AW) OTS price $1.10

Aerospace Information Div., Washington, D. C.
LINGUISTIC PROBLEMS IN THE DIRECTION OF A SOCIALIST SOCIETY.
9 May 63, 7p.
AID T63 58 Unclassified report

Trans. from Slovo a slovesnost (Problems of Linguistics), 23:4, pp. 244-248, 1962.

Descriptors: *Cybernetics, *Language, Communication theory, Control, Communism, Social sciences.

AD-403 826 Div. 32, 30
(TISTB/AW) OTS price $4.00

North American Aviation, Inc., Downey, Calif.
INFORMATION RETRIEVAL: SYSTEMS AND TECHNOLOGY A LITERATURE SURVEY.
15 Jan 63, 272p. SID 63 199
Unclassified report

Descriptors: *Information retrieval, *Bibliographies, *Indexes, *Documentation.

A survey of the world's literature on information storage and retrieval produced between the years 1951-1961 is presented. A brief description of the field is given along with statistical data on the scope and growth of the literature. There are 1,914 references in the bibliography part of the survey arranged in alphabetical order by the author. A subject index follows the bibliography. (Author)

AD-403 889 Div. 32
(TISTP/FR) OTS price $.75

Biomedical Lab., Aerospace Medical Div., Wright-Patterson Air Force Base, Ohio.
INFORMATION, STORAGE AND RETRIEVAL: A SURVEY. Final rept.,
by George W. Barnard and Carl Abbott. Jan 63, 15p.
AMRL TDR63 8 Unclassified report

Descriptors: *Information retrieval, Documentation, Subject indexing, Vocabulary.

The field of information retrieval, the methods of indexing and storing the vast number of scientific documents which have been produced in recent years is surveyed. Information retrieval utilizes coordinate indexing -- that is, listing documents under all the topics they contain and searching for them by two or more terms. There are two principal types of indexing:

one using a predetermined list of terms into which all documents must be fitted and the other allowing free choice of the terms found in the documents themselves. Elaboration of these methods and the difficulty of developing a list of indexing terms are also discussed. An information retrieval system may consist of an index only, an index with an abstract, or an entire document with an index. The mechanical equipment used may range from punched cards through IBM cards to complex computers and microphotographic systems. The experiences of various organizations with different combinations of equipment and methods are discussed. (Author)

AD-404 107 Div. 32
(TISTB/AW) OTS price $3.60

Rand Corp., Santa Monica, Calif.
SOME APPLICATIONS OF OPERATIONS RESEARCH TO PROBLEMS OF DEVELOPING COUNTRIES.
by Charles Wolf, Jr. Apr. 63, 32p. P2732.
Unclassified report

Descriptors: *Operations research, *Political science, Economics, Decision making, Foreign policy.

The use of quantitative analytical techniques in decision-making with regard to the problems of developing countries is suggested. Some contributions are: raising and tightening the level of discussion preceding decisions; uncovering and clarifying the alternative choices that are available; and focusing conscious attention on the policy 'values' or preferences that are implicit in a particular choice by making explicit the foregone benefits associated with the available alternatives. (Author)

AD-404 162 Div. 32
(TISTM/LMH) OTS price $1.60

California U., Berkeley.
THE ECONOMICS OF EDUCATION: A SURVEY,
by Barbara Woodfill. Apr 63, 13p. TR12
Contract Nonr222 77, Proj1 NR047 029
Unclassified report

Descriptors: *Education, *Economics, Training, Measurement, Statistical data, Costs, Professional personnel, Instructors.

AD-404 178 Div. 32
(TISTP/JEA) OTS price $10.50

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
STUDY OF ATTACK WARNING-ACTION SELECTION. A WARNING DECISION STUDY.
Final rept.,
by Norman P. Salz and Jaime F. Torres. Apr 63, 117p. VP1698G1
Contract OCD OS62 138
Unclassified report

Descriptors: *Early warning systems, *Civil defense systems, *National defense, Analysis, Reliability, Political science, Communication theory, Selection, Background, Correlation techniques, Processing, Management engineering.

The procedures for the transmission of attack warning from NORAD through the states to local governments are well established and in daily use. An evaluation of these procedures and the development of improved methods to influence, expedite and activate decisions at the state and local level are the subjects of the present AWAS study. The approach employed in this program is to study the operational survival plans of a sampling of states and localities, to supplement the basic input data with conferences when deemed necessary, and from the available data to: (1) analyze the characteristics of the present warning decision process; (2) identify the problems of the warning decision process; (3) determine the critical factors in the present warning decision process; (4) recommend improvements in the warning decision process; (5) recommend research required for suggested improvements; and (6) recommend required research for those problems which could not be adequately analyzed within the current program. (Author)

AD-404 194 Div. 32
(TISTM/LMH) OTS price $12.50

Gautney and Jones, Washington, D. C.
FALLOUT SHELTER COMMUNICATIONS STUDY.
Dec 62, 171p.
Contract OCD OS62 123
Unclassified report

Descriptors: *Communication systems, *Civil defense systems, Shelters, Sociometrics, Psychology, Public opinion, Adjustment (Psychology), United States Government, Geography, Networks.

A study was conducted during the period May through December, 1962, to determine the inter- and intra-emergency shelter information requirements and to propose ways and means of meeting them which could be embodied in a pre-attack shelter plans. Montgomery County, Maryland, was chosen as a representative community for the study prototype. The major consideration for this study was the assumption of a radioactive fallout effect only, compelling all in the County to remain in fallout shelters for a period of approximately two weeks. The communication requirements necessary for the control, cohesion, and maintenance of a population group of some 350,000 for the two-week period following the thermonuclear attack were identified. These requirements, totalling ten categories of information, were then subjected to an analysis to determine the time required to transmit, receive, and relay essential messages over a single leased wire telephonic network, employing the principle of a command and control communication net. Also proposed was a two-way radio backup to the primary telephonic system. The time analysis demonstrated that the proposed communication system will be more than adequate to fulfill all the communication requirements but one. The exception is the category of information relating to the separation of individual family members. (Author)

AD-404 538 Div. 32
(TISTM/LMH) OTS price $11.00

RAND Corp., Santa Monica, Calif.
RESEARCH AND DEVELOPMENT IN THE COMMON MARKET VIS-A-VIS THE U.K., U.S., AND U.S.S.R.,
by Arnold Kramish. May 63, 135p. P 2742
Unclassified report

Descriptors: *Commerce, Political science, Industrial production, Industrial procurement, Economics, Labor, Scientific research, Budgets, Foeign Policy.

33. TRANSPORTATION

No Entries

NON-MILITARY AND OLDER MILITARY RESEARCH REPORTS

*Descriptors marked with an asterisk are included in the subject index.

BIBLIOGRAPHY

PB 163 203 OTS $2.60

George Washington U., Washington, D. C. LOGISTICS PAPERS. Appendices to Quarterly Administrative progress rept., 1 Dec 49-15 Nov 55, on Logistics Research Project, Contract Nonr-761(05). [1959] 21p. 203 refs. Issues 1-12; AD-245 230.

DESCRIPTORS: *Logistics, Bibliographies, Military personnel, Military publications.

Author index to previous papers.

ASTRONOMY

Astrophysics

NASA N62-17885 OTS $1.60

California U., La Jolla, School of Science and Engineering. THERMODYNAMIC DATA ON THE FORMATION OF SOLID CARBON AND ORGANIC COMPOUNDS IN PRIMITIVE PLAETARY ATMOSPHERES, by Hans E. Suess. Rept. on NASA Grants NsG-97-60 and NsG-98-60. Jan 62, 13p. 21 refs.

NASA N63-13761 OTS $6.60

Coll., College Station. AN INVESTIGATION OF COMPUTER COUPLED AUTOMATIC ACTIVATION ANALYSIS AND REMOTE LUNAR ANALYSIS, by Lloyd E. Fite, Edgar L. Steele, and others. Quarterly rept. on NASA Grant NsG-256-62; Contract AT(40-1)-2671. 1 Feb 63, 66p. 4 refs.

NASA N62-17940 OTS $9.60

General Electric Co., Syracuse, N. Y. STUDY OF THE STATISTICAL PROPERTIES OF MICROWAVE FIELDS NEAR AN IRREGULAR REFLECTING SURFACE WITH APPLICATION TO SOFT LUNAR LANDING, by F. R. Dickey, Jr. Final rept., 1 July 61-15 Apr 62, on NASA Contract NAS5-1188. 15 May 62, 114p. refs. R62ELS-42.

NASA N63-15805 OTS $2.60

General Mills Electronics Group, Minneapolis, Minn. SPUTTERING EFFECTS ON THE MOON'S SURFACE, by G. K, Wehner. Quarterly status rept. no. 4, 18 Jan-17 Apr 63 on NASA Contract NASw-424. 17 Apr 63, 29p. 45 refs. Rept. no. 2389.

NASA N62-16935 OTS $4.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena. THE 1961 JPL VENUS RADAR EXPERIMENT, by W. K. Victor and R. Stevens. Rept. on NASA Contracts NAS7-100 and NASw-6. 11 Apr 62, 43p. 10 refs.

NASA N63-13597 OTS $7.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena. A CATALOG OF MICROSTRUCTURES OBSERVED IN CARBONACEOUS CHONDRITES, by Gregg Mamikunian and Michael H. Briggs. Rept. on NASA Contract NAS7-100. 15 Mar 63, 79p. 20 refs. JPL-TR-32-398.

NASA N63-13753 OTS $1.60

Rensselaer Polytechnic Inst., Troy, N. Y. CHEMISTRY OF THE ATMOSPHERE OF THE PLANET VENUS, by P. Harteck, R. R. Reeves, Jr., and others. Technical rept. no. 1, Aug 62-31 Jan 63, on Grant NsG-261-62. 1963, 11p. 24 refs.

NASA N63-13443 OTS $1.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena. PLANET ILLUMINANCE, by G. W. Meisenholder. Rept. on NASA Contract NAS7-100. 10 Nov 62, 20p. 1 ref. JPL-TR-32-361.

NASA N63-13448 OTS $1.10

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena. A PRELIMINARY MODEL OF THE VENUS ATMOSPHERE, by L. D. Kaplan. Rept. on NASA Contract NAS7-100. 12 Dec 62, 10p. 11 refs. JPL-TR-32-379.

NASA N63-13484 OTS $4.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena. RADAR EXPLORATION OF VENUS, by Richard M. Goldstein. Rept. on NASA Contract NAS7-100. 25 May 62, 43p. 10 refs. JPL-TR-32-280.

NASA N63-16441 OTS $1.10

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena. A SEARCH FOR WATER VAPOR AND TRACE CONSTITUTENTS IN THE VENUS ATMOSPHERE, by Hyron Spinrad. Rept. on NASA Contract NAS7-100. 1 Oct 62, 9p. 13 refs. Technical rept. no. 32-256.

NASA N63-13767 OTS $2.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena. THERMAL PROPERTIES OF A SIMULATED LUNAR MATERIAL IN AIR AND IN VACUUM, by E. C. Bernett, H. L. Wood, and others. Rept. on NASA Contract NAS7-100. 25 Nov 62, 23p. 11 refs. JPL-TR-32-368.

AD-285 869 OTS $3.60

Stanford Electronics Labs., Stanford U., Calif.
9-CM OBSERVATIONS OF TAU A, VIR A, CEN A, SAG A, AND THE ORION AND OMEGA NEBULAS, by A. G. Little. Scientific rept. no. 17 on Contract AF 18(603)53. Nov 61, 38p. 19 refs. Stanford Radio Astronomy Institute pub. no. 16; AFOSR-1605.

DESCRIPTORS: *Nebulae, *Extraterrestrial radio waves, *Parametric amplifiers, Antennas, Radio astronomy, Radio interferometers.

Fan-beam observations of Tau A, Vir A, Cen A, Sag A and the Orion and Omega nebulas have been made using a wideband parametric amplifier connected to the Stanford microwave spectroheliograph. For all sources, meridian transit observations have been made with the E-W arm of the instrument. In the case of Taurus A and Virgo A, additional observations were made with the N-S antenna as the sources rose and set through its prime-vertical fan beam. Hence, for these sources, diameter measurements have been made for three different position angles. Source widths and flux densities have been derived and are given along with the derived transit times. (Author)

AD-281 837 OTS $8.10

Stanford Electronics Labs., Stanford U,, Calif.
THE MAGNETOSPHERE DURING MAGNETIC STORMS: A WHISTLER ANALYSIS, by D. L. Carpenter. Technical rept. no. 12 on Contract AF 18(603)126 and Grant NSF G-17037. June 62, 83p. 41 refs. Rept. no. SEL-62-059; AFOSR-2653.

DESCRIPTORS: *Magnetic storms, Atmospherics, Terrestrial magnetism, Magnetic fields, Ionosphere, Electrons, *Whistlers.

In this report, a new "extension" method of scaling ordinary whistlers for frequency and delay at the whistler nose is described. The method provides a substantial increase in the number of whistlers from which information on electron density in the magnetosphere can be obtained. A study of experimental error shows that the extension method provides information on electron-density level that is comparable in accuracy with that obtained from direct observations (relatively rare) of nose traces.

AD-275 790 OTS $3.60

Stanford Electronics, Labs., Stanford U., Calif.
STANFORD MICROWAVE SPECTROHELIOGRAMS FOR 1960 JULY, by G. Swarup. Scientific rept. no. 12 on Contract AF 18(602)53, Mar 62, 35p. 3 refs. Stanford Radio Astronomy Inst. pub. no. 12; SEL-62-028 AFOSR-1604; NASA N62-12636.

DESCRIPTORS: *Radio astronomy, *Solar spectrum, Ultra high frequency, Spectrographic analysis, Microwave slectroscopy, Mapping.

By means of a microwave spectroheliography maps were made of the sun which show the disc distribution of solar radio emission at 9.1-cm wavelength by means of radioisophotes, or lines of constant brightness temperature. The contour interval, which varies from may to map, is usually about 80,000 °K, and is determined after the map is drawn by reference to the measured flux density of the whole sun.
(See also AD-257 820)

BEHAVIORAL SCIENCES

Human Engineering

PB 163 183 OTS $2.60

Air Crew Equipment Lab., Naval Air Material Center, Philadelphia, Pa.
HUMAN ENGINEERING INVESTIGATIONS OF AIRCRAFT COCKPIT VISUAL DISPLAYS. PART 1: TIME ESTIMATION AND ANXIETY, by Neal M. Burns and Edmund C. Gifford. 29 Nov 60, 23p. 16 refs. NAMC-ACEL-424; TED NAM AV-43001; AD-233 165.

DESCRIPTORS: Human engineering, Psychometrics, Aircraft, *Cockpits, Vision, *Display systems, *Time, *Anxiety, Reaction (Psychology).

Scores on the Manifest Anxiety Scale (MAS) were compared with those on a time estimation (TE) test. The hypothesis to be tested was that high MAS scorers will have difficulty withholding a response as revealed by their performance on the TE test. A significant correlation between MAS and TE scores was obtained for the longer intervals to be estimated (180 and 300 seconds), thus substantiating the hypothesis to be tested. A simple transformation facilitating the comparison of estimates of four time intervals and some other incidental findings are also reported. (Author)

NASA N63-13451 OTS $1.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
GENERAL THEORY OF PERSONNEL DECISION, by J. S. Brady. Rept. on NASA Contract NAS7-100. 15 Jan 63, 20p. 16 refs. JPL-TR-32-391.

Personnel and Training

NASA N63-13542 OTS $1.10

National Aeronautics and Space Administration, Washington, D. C.
THE SOCIAL AND MORAL RESPONSIBILITIES OF SCIENTISTS AND ENGINEERS, by Hugh L. Dryden. 14 Feb 63, 8p.

PB 163 206 OTS $18.50

Psychological Research Association, Inc., Arlington, Va.
DESIGN AND EVALUATION OF A SELF-TUTORING METHOD FOR ON-SITE TRAINING IN SAGE AN/FST-2 TROUBLESHOOTING, by Edward C. Weiss, J. Jepson Wulff and others. Rept. on Contract AF 19(604)5616. [1961] 199p. 2 refs. PRA Rept. 60-31; AFCCDD-TN-60-26; AD-245 637.

DESCRIPTORS: Design, *Training, *Air traffic control systems, *Antiaircraft defense systems, Maintenance personnel, Maintenance, *Training devices, Data transmission systems, Radar equipment, Radio equipment, *Teaching machines, Programming (Computers)

The study was conducted to provide materials and functional specifications for a self-instructional device. The training materials provided for fault localization

within the Fine Grain Data Section of the AN/FST-2. Fault localization was to the smallest functional unit which could be determined through the use of built-in indicators. Prototype training materials and functional specifications for a versatile fully automated device are presented. (Author)

PB 163 207 OTS $2.60

Psychological Research Associates, Inc., Arlington, Va.
DESIGN AND EVALUATION OF A SELF-TUTORING METHOD FOR ON-SITE TRAINING IN SAGE AN/FST-2 TROUBLESHOOTING. II. A REVISED PROGRAM, by Edward C. Weiss and J. Jepson Wulff. Rept. on Contract AF 19(604)5616. [1961] 21p. PRA Rept. 61-1; AFCCDD-TN-60-61; AD-249 863.

DESCRIPTORS: Design, *Training, *Air traffic control systems, *Antiaircraft defense systems, Maintenance personnel, Training films, *Teaching machines, Programming (Computers)

A previous study, reported in AFCCDD-TN-60-26 (PB 163 206) developed and field tested a programmed course of instruction to foster maintenance performance by AN/FST-2 maintenance technicians. The present report described a work effort which was initiated to translate the prototype training materials developed during the previous study into a storyboard format from which a sound film could be produced. The storyboard materials are more than a translation of the previous text into a format which meets the requirements for the production of a film. Rather, they represent a complete revision of the prototype course in terms of the troubleshooting procedures and materials, the course program, and the more mechanical aspects of the training materials such as the test procedures which are employed. The most significant aspect of the revision is the elimination of the more generalized aspects of troubleshooting, per se, and a heavier emphasis from the outset on their application to the AN/FST-2. A diagram of the new program is also presented. (Author)

Psychology

AD-293 994 OTS $3.60

Aeromedical Research Lab., (6571 st), Holloman AFB, N. Mex.
CHIMPANZEE PERFORMANCE DURING A SIMULATED THREE-DAY SPACE FLIGHT, by Donald N. Farrer and Victor Bogo. Dec 62, 33p. 7 refs. ARL-TDR-62-25; NASA N63-11790.

DESCRIPTORS: *Behavior, *Primates, *Space flight, Reaction (Psychology), Simulation, Food, Closed-cycle ecological systems.

Chimpanzee performance during a simulated 97-hour space flight profile environment was evaluated with a pilot study (two subjects) and a crossover design (two subjects). The response rate on the continuous avoidance task was significantly lower for one subject in the 100% O_2 environment, and both subjects performed at lower rates during night work sessions on all tests. There was no evidence of reaction time decrement for any subject on the discrete avoidance task. Food and water consumption was poor during the simulated space flight, but a chimpanzee could withstand a 97-hour flight profile environment of 100% O_2 at 14.7 psi for 15 hours followed by 100% O_2 at 5 psi, for 82 hours without serious performance changes. (Author)

AD-283 425 OTS $2.60

Aeromedical Research Lab. (6571 st), Holloman AFB, N. Mex.
CHIMPANZEE PERFORMANCES ON A TWO-DIMENSIONAL DISCRETE TRACKING TASK, by Marvin E. Grunzke, Frederick H. Rohles and others. July 62, 26p. 5 refs. ARL-TDR-62-16; NASA N62-16742.

DESCRIPTORS: *Primates, *Behavior, *Tracking, Reaction (Psychology), Food.

A chimpanzee was trained to perform a two-dimensional discrete tracking task with 25 target positions in each dimension. Performance required manipulation of two levers to align the tracking indicants with the target. Subsequent to this, the operation of a third lever resulted in the delivery of a food pellet reward and presentation of a new set of targets to be matched. (Author)

AD-282 687 OTS $4.60

Aeromedical Research Lab., (6571 st), Holloman AFB, N. Mex.
A DETAILED ACCOUNT OF CHIMPANZEE PERFORMANCE DURING THE BALLISTIC AND ORBITAL PROJECT MERCURY FLIGHTS, by Frederick H. Rohles, Jr., Marvin E. Grunzke, and Herbert H. Reynolds. July 61, 42p. 10 refs. ARL-TDR-62-15; NASA N62-15368.

DESCRIPTORS: *Conditioned reflex, *Space flight, *Primates, *Motor reactions, Laboratory animals, *Weightlessness, *Acceleration, Deceleration.

Two space flights with chimpanzees were made as part of the Project Mercury program. In the first flight the subject was placed through a ballistic trajectory and during the flight had to perform a continuous and discrete avoidance task. During a second flight in which the capsule orbited the earth twice, a chimpanzee had to perform a complex multiple operant task. (Author)

AD-278 546 OTS $1.60

Aeromedical Research Lab. (6571st), Holloman AFB, N. Mex.
THE PERFORMANCE SCHEDULE FOR EXTENDED SPACE FLIGHT WITH THE CHIMPANZEE, by Frederick H. Rohles, Jr., Herbert H. Reynolds, and others. July 61, 16p. 4 refs. ARL-TDR-62-14.

DESCRIPTORS: *Space flight, *Primates, *Motor reactions, Vision, Hearing, Behavior, Food, Water, Physiology, Reaction (Psychology).

This report describes a schedule designed for measuring animal performance during space flight which is oriented toward sampling simple motor behavior and visual and auditory monitoring, as well as requiring performance for food and water. Employment of this schedule should facilitate the animal to human extrapolation. (Author)

AD-793 881 OTS $1.10

Aeromedical Research Lab. (6571 st), Holloman AFB, N. Mex.
A PROPOSED APPROACH TOWARD DETERMINING THE PSYCHOPHYSIOLOGICAL EFFECTS OF PROLONGED MANNED SPACE FLIGHTS, by Frederick H. Rohles, Jr. and Herbert H. Reynolds. Dec 62, 8p. 1 ref. ARL-TDR-62-28; NASA N63-11792.

DESCRIPTORS: *Space flight, *Space medicine, *Stress (Physiology), *Stress (Psychology), *Weightlessness, *Cosmic rays, *Primates, Radiation effects.

Orbital space flights are proposed to study the psychophysiological effects of prolonged weightlessness and cosmic radiation. The program presented will use animal subjects and attempts to eliminate weightlessness and cosmic radiation as deterrents to manned space flights of higher altitudes and longer duration. (Author)

AD-297 255 OTS $1.60

Aeromedical Research Lab. (6571 st), Holloman AFB, N. Mex.
THE REFRACTIVE ERROR AND INTRAOCULAR PRESSURE OF IMMATURE CHIMPANZEES, by Francis A. Young (Primate Research Center, Washington State U.) and Donald N. Farrer. Feb 63, 20p. 16 refs. ARL-TDR-63-3.

DESCRIPTORS: *Eye, *Primates, *Refraction, *Pressure, Measurement, Anesthesia.

Forty-three chimpanzees, 26 males and 17 females, ranging in age from 2 years to 8 years with about 62 percent being less than 5 years old, were refracted in the supine position under Pentothal Sodium anesthesia and Cyclopentolate Hydrochloride cycloplegia. Intraocular pressures were measured under these conditions in 42 of the animals. In addition to the measurements taken under anesthesia, 22 animals were refracted without anesthesia and on 16 of these, intraocular pressures were obtained. (Author)

PB 163 215 OTS $2.60

Columbia U., New York.
EYE DOMINANCE AND TRACKING PERFORMANCE, by A. S. Gilinsky and J. L. Brown. Rept. on Contract AF 33(038)22616. 21p. 11 refs. WADC Technical rept. 52-15; AD-6460.

DESCRIPTORS: Eye, *Optical tracking, *Vision, Transfer of training, Visual acuity, Motion, Performance tests, Learning, Optical equipment.

The relative efficiency of performance of the dominant eye was compared with that of the nondominant eye in a compensatory tracking task. Performance was measured in terms of time on target and errors per trial. No significant differences were noted between the results obtained prior to training with the dominant eye from those obtained with the nondominant eye. A small differential practice effect in favor of the dominant eye was observed for the first half of training. The over-all results showed that the conclusion cannot be drawn that the dominant eye is superior to the nondominant eye in a compensatory tracking task. (DDC abstract)

PB 163 236 OTS $2.60

Minnesota U. [Minneapolis].
BASIC STUDIES ON INDIVIDUAL AND GROUP BEHAVIOR. Annual technical rept., 16 Feb 55-15 Nov 56, on Research Studies on the Role of Language in Behavior, Contract N8onr-66216. 15 Nov 56, 26p. 3 refs. AD-115 743.

DESCRIPTORS: *Behavior, *Group dynamics, *Language, Aptitude tests, *Verbal behavior, *Confined environments, Psychometrics, *Stress (Psychology), Personality, *Reaction (Psychology)

Contents:
Studies of the semantic differential
Studies of verbally mediated generalization
Analysis of word association phenomena
Research on isolation
Research on conflict
Effects of power difference on interpersonnal influence

BIOLOGICAL SCIENCES

AD-285 137 OTS $3.60

Battelle Memorial Inst., Columbus, Ohio.
THE FURTHER DEVELOPMENT AND EVALUATION OF AURAL READING DEVICES FOR THE BLIND, by John L. Coffey, Diane M. Metcalf, and Jean M. Creswick. Summary rept., 1 July 61-30 June 62, on Contract V1005 M-1961. 30 June 62, 39p.

DESCRIPTORS: *Blindness, *Reading machines, Reading, Hearing, Training, Teaching machines.

The present 200-lesson group training program represents one successful method of instructing groups of blind subjects in the use of the Battelle reader. The Battelle aural reading device can be used by selected blind subjects with a reasonable degree of speed and efficiency. The probability of success with the Battelle reader is substantially improved if blind candidates for training are initially subjected to selection procedures. The relative performance of individual members of a class can be determined with a fairly high degree of confidence early in training. It appears to be feasible to convert the present group training program into an individual training program.

NASA N63-13598 OTS $1.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
THE ROLE OF SOIL SCIENCE IN SPACE EXPLORATION, by Roy E. Cameron. Rept. on NASA Contract NAS7-100. 16 Feb 63, 20p. 57 refs. JPL-TR-32-399.

Anatomy and Physiology

PB 163 204 OTS $15.00

Donner Lab., U. of California, Berkeley.
STUDIES ON GAS EXCHANGE, by J. W. Wilson, R. C. Ivy (Northwestern U. Medical School) and others. Final rept. on Contract W 33-038-ac-14290. 3 Mar 48, 227p. 142 refs. Memorandum rept. no. MCREXD-696-114; AD-51 441.

DESCRIPTORS: Gases, Physiology, *Respiratory system, Nitrogen, Decompression, *Decompression sickness, Flight, *High altitude, Aviation Personnel

The study of decompression physiology and preselection of decompression personnel that was begun under OSRD sponsorship has been continued under this contract. A summary of the gas exchange studies is appended in a paper entitled "Preoxygenation and Nitrogen Elimination" by H. B. Jones. It shows that there is a consistency between the various reports of rates and amount of nitrogen elimination and a rational integration between the existing theories of nitrogen elimination. Included are tables of preoxygenation times for various groups from which prediction of military flights can be made as regards decompression sickness.

PB 181 514 OTS $6.00

Geophysical Inst., U. of Alaska, College.
NEURAL ASPECTS OF TEMPERATURE REGULATION, ed. by John P. Hannon and Eleanor Viereck. Rept. on Contract AF 41(657)356. 1961, 412p.

DESCRIPTORS: Neurology, *Body temperature, Physiology, *Sensory mechanism, Sense organs, *Exposure, Brain, Spinal cord, *Autonomic nervous system, *Blood circulation, Nerves, *Thalmus, *Shivering, *Neuromuscular transmission, *Chemorecptors, Heat

Symposium held at Arctic Aeromedical Lab., Fort Wainwright, Alaska, October 9-11, 1960.

Contents:
The neural control of the physiological responses to cold. Historical review, by A. Hemingway
Recent advances in thermoreceptor physiology, by H. Hensel
Central and peripheral mechanisms in temperature regulation, by T. P. K. Lim
The role of vasoconstrictor and vasodilator nerves in the control of the peripheral circulation, by I. C. Roddie
Heat dissipation functions following experimental anterior hypothalamic lesions in cats, by G. Clark
Neuro-muscular organization of shivering, by Y. Kawamura
Nervous pathways in the chemical regulation against cold and their central control, by J. Chatonnet
A critique of the doctrine of centers in temperature regulation, by W. J. Freeman
Role of the prosencephalon in shivering, by D. G. Stuart

Biochemistry

NASA N63-16152 OTS $2.60

Connecticut Agricultural Experiment Station, New Haven.
OPTIMUM LIGHTING OF LEAVES, by Dale N. Moss. Rept. on NASA Contract NASr-129. [1963] 25p. 5 refs.

NASA N62-16776 OTS $7.60

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
STUDY OF THE PURIFICATION OF WATER FROM BIOLOGICAL WASTE, by A. H. Okamoto and J. J. Konikoff. Annual rept. no. 2 (Rev.) 5 Feb 60-15 Jan 62 on NASA Contract NASw-127. June 62, 72p. 32 refs. Revision of AD-274 149.

Microbiology

NASA N63-13268 OTS $5.60

General Mills Electronics Group, Minneapolis, Minn.
RESEARCH TO DETERMINE THE EXISTENCE AND IDENTITY OF VIABLE MICROORGANISMS IN THE STRATOSPHERE, by V. W. Greene. Final rept., 1 Jan-31 Dec 62, on NASA Contract NASr-81. 31 Dec 62. 58p. 13 refs. Rept. 2363.

NASA N62-17996 OTS $1.60

Research and Advanced Development Div., AVCO Corp., Wilmington, Mass.
THE ACTION OF MONOCHROMATIC ULTRAVIOLET LIGHT ON LUMINESCENCE IN ARMILLARIA MELLEA, by Martha D. Berliner. Quarterly progress rept. on NASA Contract NASw-389. 1962, 19p. 11 refs.

Pathology

PB 163 229 OTS $5.60

Pennsylvania State U., University Park.
STRESS EFFECTS OF NOISE IN VERTEBRATE ANIMALS, by Adam Anthony and Eugene Ackerman. Rept. for 1 Oct 57-30 Sep 58, on Acoustic Energy Control, Contract AF 33(616)2505. Sep 59, 59p. 47 refs. WADC Technical rept. 58-622.

DESCRIPTORS: *Stress (Physiology), *Noise, *Laboratory animals, *Adrenal glands, High frequency, Behavior, Eosinophils.

Rats, mice and guinea pigs were exposed to noise in two frequency ranges (150-4800 cps and 2-40 kc) at a sound pressure level of 135-140 db. Exposure time was 20-40 hours per week for 2 to 9 weeks. Stress response of the animals was measured by changes in the adrenal glands and other organs. It was most severe in animals exposed for the longest time to high frequency noise. (Author)

PB 181 513 OTS $0.50

Utah U. Coll. of Medicine, Salt Lake City.
EFFECT OF EXPOSURE TO LOW TEMPERATURE ON DEVELOPMENT OF SPIROCHAETE PALLIDA IN THE RABBIT, by Stanley Marcus, Fred Miya and others. Oct 61, 8p. 7 refs. AAL TR-61-43.

DESCRIPTORS: *Exposure, Body temperature, *Rabbits, *Venereal disease, *Spirochaeta, Inhibition

Adult male albino rabbits challenged intratesticularly with viable Spirochaete pallida suspension and kept at 3° C or 21° C developed syphilomata at the same rates. Adverse environmental temperatures apparently do not enhance or decrease the rabbit's resistance to the challenge. Rectal temperature measurements during the experimental period show no gross differences in animals kept at 3° C or 21° C, and the temperatures remained quite constant throughout the experiment. (Author)

CHEMISTRY

Analytical Chemistry

NASA N63-14103 OTS $1.60

General Atomic Div., General Dynamics Corp., San Diego, Calif.
ABUNDANCES OF THE FOURTEEN RARE-EARTH ELEMENTS PLUS YTTRIUM AND SCANDIUM IN METEORITES, by R. A. Schmitt, R. H. Smith, and others. Quarterly progress rept. on NASA Contract NASw-597. 15 Feb 63, 19p. 20 refs. GA-3961.

NASA N63-13444 OTS $1.10

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
DETERMINATION OF WATER IN HYDRAZINE BY GAS CHROMATOGRAPHY, by Daniel M. Kuwada. Rept. on NASA Contract NAS7-100. 15 Nov 62, 8p. 4 refs. JPL-TR-32-362.

Physical Chemistry

NASA N63-15203 OTS $3.60

Cornell U. Graduste School of Aeronautical Engineering, Ithaca, N. Y.
ABSORPTION SPECTRA OF POLYATOMIC MOLECULES AT HIGH TEMPERATURES. II: BENZENE AND PERFLUORBENZENE. KINETICS OF THE PYROLYSIS OF BENZENE, by S. H. Bauer and C. F. Aten, Jr. Tech. rept. on NASA Grant NsG-116-61. Dec 62, 40p. 16 refs. CU-7470.

NASA N63-13471 OTS $1.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
KINETICS OF THE REACTION BETWEEN ALCOHOLS AND ISOCYANATES CATALYZED BY FERRIC ACETYLACETONATE, by Leroy Schieler. Rept. on NASA Contract NASw-6. 1 July 61, 20p. 11 refs. JPL-TR-32-129.

NASA N63-13442 OTS $1.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
STRUCTURAL TRANSFORMATION IN PYROLYTIC GRAPHITE ACCOMPANYING DEFORMATION, by W. V. Kotlensky and H. E. Martens. Rept. on NASA Contract NAS7-100. 1 Nov 62, 14p. 20 refs. JPL-TR-32-360.

NASA N62-17486 OTS $11.50

Johns Hopkins U., Baltimore, Md.
GRAPHITE OXIDATION AT LOW TEMPERATURE, by H. E. Hoelscher and E. Effron. Rept. on Grant NsG-42-60. Sep 62, 155p. 100 refs.

PB 163 234 OTS $1.60

Notre Dame U. [Ind.]
A STUDY OF THE RATE OF REACTION OF NO_2 WITH VARIOUS ALCOHOLS AT LOW TEMPERATURES AND PRESSURES, by John F. Kaemmerer, Thomas G. Collins and others. Rept. on Contract [N]onr 392(00). 20 June 54, 16p. 3 refs. AD-37 732.

DESCRIPTORS: *Nitrogen compounds, Dioxides, *Alcohols, Methanols, Ethanols, Butanols, Propanols, Reaction kinetics, *Adsorbants, Heat resistant glass, Halocarbon plastics, Aluminum, Surface properties, Low temperature research, Low pressure research, Nitrites, Esters, Synthesis (Chemistry).

In a study of reaction rates for $2NO_2 + ROH = HNO_3 + RONO$, the temperature coefficient and surface effects were evaluated for all the lower alcohols, C_1 to C_4, except isobutanol. The reaction was performed in cylindrical cells, which were immersed in a thermostatic water bath. The ends of the cells protruded from the water to allow for the admission of filtered green light. Stopcocks were opened simultaneously admitting reactants to the reaction. Galvanometer readings were taken at appropriate intervals; these readings were converted to partial pressures of NO_2 by means of an empirical calibration curve. Runs proceeded until no galvanometer changes could be detected over a period of 20 min, at which time equilibrium was assumed. Results indicated that the vapor phase rate is negligible. Heats of adsorption are of the order of magnitude of heats of vaporization. Since both rate and equilibrium conversion are seriously reduced by increased temperature, practical use of the reaction will be limited to lower temperatures, (DDC abstract)

NASA N63-13650 OTS $2.60

Southern Research Inst., Birmingham, Ala.
A STUDY OF POLYMERS CONTAINING SILICON NITROGEN BONDS, by Robert E. Burks, Jr. and Thomas W. Ray. Progress rept., 4 Sep-3 Dec 62, NASA Contract NAS8-1510. 14 Dec 62, 24p. 8 refs. Rept. no. 5656-1259-XXIII

NASA N63-13639 OTS $5.60

Southern Research Inst., Birmingham, Ala.
A STUDY OF POLYMERS CONTAINING SILICON-NITROGEN BONDS, by Robert E. Burks, Jr. and Thomas W. Ray. Progress rept. no. 16, 4 Feb-3 May 62, NASA Contract NAS8-1510. 15 May 62, 60p. 14 refs. 5301-1259-XVI.

NASA N63-13649 OTS $4.60

Southern Research Inst., Birmingham, Ala.
A STUDY OF POLYMERS CONTAINING SILICON-NITROGEN BONDS, by Robert E. Burks, Jr. and Thomas W. Ray. Quarterly rept., 4 Aug-3 Nov 62, NASA Contract NAS7-1510. 15 Nov 62, 49p. 20 refs. Rept. no. 5597-1259-XXII.

NASA N63-16444 OTS $2.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena. SOME GEOLOGIC PROBLEMS OF MARS, by Alden A. Loomis. Rept. on NASA Contract NAS7-100. 4 Mar 63, 22p. 37 refs. Technical rept. no. 32-400.

AD-275 838 OTS $3.60

Stanford Electronics Labs., Stanford U., Calif. ELECTRON-DENSITY VARIATIONS IN THE MAGNETOSPHERE DEDUCED FROM WHISTLER DATA, by D. L. Carpenter. Technical rept. no. 11 on Contract AF 18(603)126. Mar 62, 35p. 17 refs. Rept. no. SEL-62-042; AFOSR-2339; NASA N62-12703.

DESCRIPTORS: *Van Allen radiation belt, *Electron density, Periodic variations, *Atmospherics, Radio waves, Very low frequency, *Whistlers, *Radiofrequency spectroscopy, Terrestrial magnetism, Solar disturbances, *Magnetic storms.

Electron-density variations in the magnetosphere at a geocentric distance of 2-4 earth radii are deduced from whistler observations made, primarily, at Stanford, California and Seattle, Washington. The whistler quantities scaled are frequency and group delay at the whistler nose, and group delay at 5 kc. First-order depressions in electron density are found to be associated with severe magnetic storms ($K_p \geq 6$) in both 1958 and 1961. Typical depressions exhibit density levels about 15-20 percent below average levels. The annual variation, with a minimum near the June solstice, is observed in every year from 1958 to 1961. The secular variation shows a 20-25 percent reduction in electron density from early 1958 to early 1961. Secular and annual variations are found in the latitude of the field-line-path endpoint of typical Stanford whistlers.

Climatology and Meteorology

PB 163 179 OTS $1.60

Florida State U., Tallahassee. [STUDY OF ATMOSPHERIC CONDITIONS IN THE MEDITERRANEAN AREA] by Werner A. Baum, Thomas A. Gleeson, and Holbrook Landers. Final rept. on Contract AF 19(122)466. 30 June 57, 17p. AFCRC TR-57-281; AD-117 216.

DESCRIPTORS: *Mediterranean Sea, *Meteorology, Climatology, *Atmospheric motion, Cyclones, Rainfall, Barometric pressure, Hurricanes, Wind, *Troposphere.

Work conducted during a 6-yr study of the atmospheric conditions in the Mediterranean Sea is reviewed. The following topics were covered in scientific reports number (1) cyclogenesis in the Mediterranean region; (appendix to no. 1) a bibliography of the meteorology of the Mediterranean, Middle East, and South Asia areas; (2) a study of the rainfall pattern and some related features in a dissipating hurricane; (3) on the influence of heating and cooling on the surface pressure-field in the Mediterranean area; (4) a note on criteria for the movement and development of waves (trough) in the Westerlies; (5) the temporal and geographic distribution of sea level anticyclogenesis affecting Mediterranean weather; (6) on the relations of size and central height to intensity in cyclones at 500 mb; (7) the surface of least divergence and the level of least divergence; (8) a comparison of cyclone frequencies in the North Atlantic and Mediterranean regions; (9) the vertical component of the relative vorticity in 3 dimensional space and over a 3-day period, (10) a case study of the December 1950 cyclogenesis in the western Mediterranean region; and (11) mean monthly charts of surface streamlines and isotachs, divergence of the surface wind field, and temperatures over the Mediterranean Sea.

PB 163 159 OTS $12.50

[General Dynamics] Pomona, Calif. AIR-LAUNCHED ROCKETSONDE EQUIPMENT, PHASES II AND III, by N. E. Maxwell and K. F. Bloom. Technical summary rept., 19 Apr 57-26 Jan 60, on General Weather Reconnaissance Equipment, Contract AF 33(616)3704. 26 Feb 60, 178p. WADD Technical rept. 60-253; AD-238 863.

DESCRIPTORS: *Sounding rockets, Instrumentation, Rocket launchers, *Launching, Design, Flight testing, Tests, Meteorological instruments, Pressure, Temperature, Humidity, Humidity sensitive elements, Ozone, Measurement, Airborne.

Design criteria for an air-launched rocketsonde test vehicle are presented. The vehicle is approximately 8 in. in diameter and 8 ft long with an initial weight of 230 lb. It is air-launched from a parachute stabilized launching tube after dropping from an aircraft bomb rack. The design altitude of 150,000 ft can be attained for any launch altitude above 16,000 ft. Details of the system design are reviewed and the results of laboratory tests of components and assemblies are presented. The flight test program has demonstrated the operational feasibility of the air-launched rocketsonde with successful rocket launchings from both ground and air. The detailed results of the flight tests are presented and discussed. The results of a preliminary design study and prototype manufacture of a meteorological instrument package are presented. This package contains pressure, temperature, humidity, and ozone sensors chosen for their availability and suitability for rocketsonde use to 150,000 ft altitude.

AD-299 000 repriced $1.50

Travelers Research Center, Inc., Hartford, Conn. OBJECTIVE TECHNIQUES FOR THE ANALYSIS OF CLOUDS AND CEILINGS, by Earl L. Davis. Technical pub. no. 18 on Contract FAA/BRD-363. Nov 62, 51p. Rept. no 7044-35.

DESCRIPTORS: *Clouds, *Cloud cover, Numerical methods and procedures, Sequences, Statistical analysis, Atmospheric condensation, Weather forecasting, Meteorological parameters, Cloud height indicators, Analysis, Numerical analysis, Ceiling.

Physics of the Atmosphere

NASA N62-15870 OTS $2.60

Geophysics Corp. of America, Bedford, Mass.
SOME MEASUREMENTS OF THE COEFFICIENT OF DIFFUSION IN THE UPPER ATMOSPHERE, by E. Manring, and H. Knaflich. Rept. on Contract NAS5-215. Mar 61, 24p. 6 refs. GCA Technical rept. 61-3-N; AD-258 656.

NASA N63-13091 OTS $1.10

High Altitude Engineering Lab., U. of Michigan, Ann Arbor.
ANALYTIC SOLUTION FOR ATMOSPHERIC DENSITY FROM SATELLITE MEASUREMENTS OF STELLAR REFRACTION, by P. B. Hays and F. F. Fischbach. Technical rept. on NASA Contract NASw-140. Jan 63, 7p. 3 refs. ORA Proj. 04963.

NASA N62-17746 OTS $2.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
RADIO FREQUENCY MASS SPECTROMETER FOR THE INVESTIGATION OF THE ION COMPOSITION OF THE UPPER ATMOSPHERE, by V. G. Istomin. Rept. on Contract NAS7-100. 12 May 62, 42p. 19 refs. JPLAI/Trans-27 from Iskusstvennye Sputniki Zemli (USSR) 1959, v. 3, p. 98-112.

NASA N63-14291 OTS $1.10

National Aeronautics and Space Administration, Washington, D. C.
THE EXPLORATION OF SPACE, by Hugh L. Dryden. 1963, 8p.

NASA N63-13738 OTS $2.60

National Aeronautics and Space Administration, Washington, D. C.
S-6, AN AERONOMY SATELLITE, by R. Horowitz. 1962, 24p. AAS Preprint 62-81.

ENGINEERING

PB 181 345 $2.25

Southern Research Inst., Birmingham, Ala.
DETERMINATION OF THE PRACTICALITY OF THE OSMIONIC PROCESS. Rept. on Contract 14-01-001-193. Aug 62, 98p. 11 refs. Office of Saline Water Research and Development progress rept. no. 64.

DESCRIPTORS: *Sea water, Water, *Desalination, *Demineralizers, Design, Construction, Operation, Costs, Tests, Electrodialysis.

A design for osmionic demineralizers has been developed that gives demineralization performance very close to the performance that is theoretically possible. The final design was evaluated experimentally in short-term runs and was found to give trouble-free operation for two weeks of intermittent operation. It is believed that no major improvements in demineralization performance can be expected from changes in the physical design. The corrected theoretical expressions describing demineralization performance have been experimentally validated. It has been shown that the usual methods for measuring membrane resistance give values that may not be representative of the resistance actually occurring during demineralization. A method for measuring the membrane resistance under the conditions occurring during demineralization has been partly developed. Cost estimates have been prepared that show that even under operating conditions that are very favorable to the osmionic process, demineralization by the osmionic process will cost from 2 to 3 times as much as demineralization by electrodialysis. (See also PB 161 862)

Aeronautical Engineering

PB 163 182 OTS $1.60

[Air Crew] Equipment Lab., Naval Air Material Center, Philadelphia, Pa.
LINEAR ACCELERATION AS A SURVIVABLE HAZARD IN AVIATION, by E. Hendler. [1954] 17p. 5 refs. AD-59 333.

DESCRIPTORS: *Aviation medicine, *Acceleration tolerence, Aviation accidents, *Aviation safety, *Aircraft equipment, *Safety harness, Design, Effectivness, Testing, *Catapults.

This paper considers certain aspects of evaluating aircraft equipment which has been designed to provide crash protection to the body.

PB 163 186 OTS $8.10

Air Force Flight Test Center, Edwards AFB, Calif.
L-28A AIR FORCE FLIGHT EVALUATION, by Juan M. Calderon, Russell M. Dobyns, and John K. Campbell. Jan 60, 81p. AFFTC-TR-59-38; AD-232 116.

DESCRIPTORS: *Liaison planes, Tests, Flight testing, Air force, Transport planes.

The L-28 is a liaison and light cargo airplane designed to operate from unprepared fields of moderate roughness. It is designed for use as a five place vehicle and has a design gross weight of 3000 pounds with a maximum overload to 3920 pounds. The L-28A is powered by a Lycoming GO-480-GID6 engine with a take-off rating of 295 horsepower at sea level. A 77.5 hour flight program was conducted to evaluate performance, flying qualities, aircraft systems and compliance with contractor performance estimates. In its normal operating range, the L-28A is simple to operate and can, with relatively small payloads satisfactorily accomplish low altitude missions involving short take-off and landing distances from unprepared fields of moderate roughness. For a given minimum take-off and landing distance requirement, the aircraft offers better range, load carrying capabilities, speed and altitude performance than any other fixed wing aircraft in the USAF inventory. The handling characteristics of the L-28A are satisfactory, except for several stability and control characteristics at speeds below 35 knots IAS. (Author)

PB 163 187 OTS $16.50

Air Force Flight Test Center, Edwards AFB, Calif.
L-28A AIR FORCE FLIGHT EVALUATION, APPENDIX III, by Juan M. Calderon, Russell M. Dobyns, and John K. Campbell. Jan 60, 258p. AFFTC-TR-59-38; AD-232 374.

DESCRIPTORS: Tests, Flight testing, Flight speeds, *Vertical takeoff planes, *Liaison planes, Air force, Transport planes, Short take-off planes

Contents:
Take-offs
Sawtooth climbs
Sawtooth descents
Continuous climbs
Level flight speed powers
Airspeed calibration
Range mission
Landings
(See also PB 163 186)

NASA N63-15563 OTS $0.75

Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
A PRELIMINARY STUDY OF HANDLING-QUALITIES REQUIREMENTS OF SUPERSONIC TRANSPORTS IN HIGH-SPEED CRUISING FLIGHT USING PILOTED SIMULATORS, by Maurice D. White, Richard F. Vomaske, and others. May 63, 31p. 13 refs. Technical note D-1888.

NASA N63-12503 OTS $0.75

Ames [Research Center, National Aeronautics and Space Administration] Moffett Field, Calif.
TRACKING PERFORMANCE OF A SWEPT-WING FIGHTER WITH A DIRECTOR-TYPE RADAR FIRE-CONTROL SYSTEM AND SCOPE PRESENTATION, by Howard L. Turner, George A. Rathert, Jr. and Donovan R. Heinle. 20 Jan 58, declassified 25 Oct 62. 24p. 8 refs. Research memo. RM A57J01.

PB 163 157 OTS $6.60

Cornell U. Medical Coll., New York.
AIRCRAFT SAFETY BELTS: THEIR INJURY EFFECT ON THE HUMAN BODY, by Hugh De Haven, Boris Tourin and Salvatore Marci. Rept. on Crash Injury Research, Contract N6onr-264-12. July 53. 66p. 3 refs. AD-14 643.

DESCRIPTORS: *Aircraft equipment, *Safety harness, *Aviation injuries, Body, *Aviation accidents.

An examination was made of the injuries sustained by 1039 survivors of 670 lightplane crashes. Chi-square methods were employed in statistical analyses to relate the use of the belt and body injuries of survivors. Safety belts were shown to be an infrequent cause of injury and to serve as effective protection. Severe snubbing action of safety belts as seen in 80 cases showed no significant correlation with the occurence of intra-abdominal and lumbar spine injuries. Critical intra-abdominal and lumbar spine injuries appeared related to each other and to vertically acting forces. Bruises and minor contusions were attributable to safety belts. Injuries which occurred without any signs of snubbing were jolt loads transmitted by supporting structures and seats. Injuries of the upper and lower torso were associated with and increased by failure of safety belt installations. The percentage of all trunk injuries sustained by users and nonusers of safety belts was similar. No increased frequency was observed in injuries to the torso, neck, and spine by the use of the belt. Survivors not using safety belts suffered more serious injury than those that used them. Upper and lower torso injuries were also related to failure of belt installations. Dangerous-to-life injuries of head and body were associated and increased with vertical crash forces. (DDC abstract)

NASA N62-16878 OTS $13.00

Engineering Design Center, Case Inst. of Tech., Cleveland, Ohio.
STRUCTURAL SYNTHESIS OF SYMMETRIC WAFFLE PLATES WITH INTEGRAL ORTHOGONAL STIFFENERS, by Lucien A. Schmit, Jr., and Thomas P. Kicher. Rept. on NASA Grant NsG-110-61. Oct 61, 188p. 39 refs. EDC-2-61-1.

NASA N63-13899 repriced OTS $1.25

Flight Research Center, National Aeronautics and Space Administration, Edwards, Calif.
FLIGHT TESTS OF A TWIN-DUCT INDUCTION SYSTEM FOR A MACH NUMBER RANGE OF 0.78 TO 2.07, by Jack Nugent and Bruce G. Powers. Sep 60, declassified 8 Feb 63. 44p. 9 refs. Technical memo. X-281.

NASA N63-12518 repriced OTS $0.75

[Flight Research Center, National Aeronautics and Space Administration] Edwards, Calif.
IN-FLIGHT GAINS REALIZED BY MODIFYING A TWIN SIDE-INLET INDUCTION SYSTEM, by Edwin J. Saltzman. 12 Dec 57, declassified 25 Oct 62. 30p. 4 refs. Research memo. RM H57J09.

NASA N63-12563 repriced OTS $1.50

Flight Research Center, National Aeronautics and Space Administration, Edwards, Calif.
LANDING-GEAR BEHAVIOR DURING TOUCHDOWN AND RUNOUT FOR 17 LANDINGS OF THE X-15 RESEARCH AIRPLANE, by James M. McKay and Betty J. Scott. Mar 61, declassified 25 Oct 62. 54p. 7 refs. Technical memo. X-518.

NASA N63-12564 repriced OTS $0.50

Flight Research Center, National Aeronautics and Space Administration, Edwards, Calif.
LANDING LOADS AND DYNAMICS OF THE X-15 AIRPLANE, by James M. McKay and Eldon E. Kordes. Mar 62, declassified 25 Oct 62. 17p. 1 ref. Technical memo. X-639.

NASA N63-12558 OTS $1.25

Langley Research Center, National Aeronautics and Space Administration, Langley Field, Va.
ANALYTICAL INVESTIGATION AND PREDICTION OF SPIN AND RECOVERY CHARACTERISTICS OF THE NORTH AMERICAN X-15 AIRPLANE, by William D. Grantham and Stanley H. Scher. Oct 60, declassified 1 Dec 62, 48p. 7 refs. Technical memo X-294.

NASA N63-12560 OTS $2.50

Langley Research Center, National Aeronautics and Space Administration, Langley Field, Va.
BASIC PRESSURE MEASUREMENTS ON A 0.0667-SCALE MODEL OF THE NORTH AMERICAN X-15 RESEARCH AIRPLANE AT TRANSONIC SPEEDS, by Robert S. Osborne and Virginia C. Stafford. Oct 60, declassified 25 Oct 62, 102p. 6 refs. Technical memo. X-344.

NASA N63-12500 OTS repriced $0.50

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
FLUTTER TESTS OF SANDWICH-TYPE FLAT PANELS AT MACH NUMBERS OF 2.97 AND 4.12, by Eldon E. Kordes and Ernest W. Evans. Dec 58, declassified 25 Oct 62, 17p. 2 refs. NASA MEMO 10-17-58L.

NASA N63-13860 OTS $2.75

Langley [Research Center, National Aeronautics and Space Administration] Langley [Station] Va.
THE ORIGIN AND DISTRIBUTION OF SUPERSONIC STORE INTERFERENCE FROM MEASUREMENT OF INDIVIDUAL FORCES ON SEVERAL WING-FUSELAGE-STORE CONFIGURATIONS. I. SWEPT-WING HEAVY-BOMBER CONFIGURATION WITH LARGE STORE (NACELLE). LIFT AND DRAG; MACH NUMBER, 1.61, by Norman F. Smith and Harry W. Carlson. 11 Mar 55, declassified 8 Feb 63. 151p. 9 refs. Research memo. RM-L55A13a.

AD 293 912 OTS $4.60

Naval Research Lab., Washington, D. C.
DISCHARGE CHARACTERISTICS OF POTASSIUM BICARBONATE DRY CHEMICAL FIRE FIGHTING AGENTS FROM CARTRIDGE AND STORED PRESSURE EXTINGUISHERS, by H. B. Peterson and R. L. Gipe. 13 Dec 62, 49p. 3 refs. NRL rept. 5853

DESCRIPTORS: *Fire extinguishers, *Chemicals, *Bicarbonates, *Potassium compounds, Cartridges, Pressure, Storage, Vibration, Powders, Test methods, Specifications.

An investigation has been made into the discharge characteristics of "Purple-K" dry chemical fire fighting materials received both from Navy field activities and directly from manufacturers. The different powders were each used in several models of cartridge type extinguishers and in a stored pressure type extinguisher Discharge measurements were made with continuous recording of the rate of change of the pressure and of the weight. Field environment was simulated in part by putting the extinguishers before discharge on a vibration table for varied times. Fixed conditions of 0.050 inch excursion in a vertical direction and 20 cps frequency were used. The longer a powder and/or extinguisher tolerates vibration and still gives good discharge, the higher is its quality.

PB 163 235 OTS $7.60

Wichita U. School of Engineering, Kans.
SYSTEMATIC TWO-DIMENSIONAL TESTS OF AN NACA 23015 AIRFOIL SECTION WITH A SINGLE-SLOTTED FLAP AND CIRCULATION CONTROL, by Richard E. Wallace and J. L. Stalter. Rept. on Contract Nonr-201(01). Aug 54, declassified 1 Sep 58. 79p. 9 refs. Aerodynamic rept. no. 120; AD-50 641.

DESCRIPTORS: *Airfoils, *Aerodynamic control surfaces, *Slotted flaps, Design, Aerodynamic characteristics, Gas flow, Tests, Wind tunnel models

A systematic, two-dimensional, wind-tunnel test program was conducted on an NACA 23015 airfoil section equipped with a single-slotted flap and blowing circulation control. The model variables included flap deflection and position, slot width, and the mass of air blown from the model. The flap deflections tested were 0, 30, 45, 60, 70, 80 and 90 degrees for nominal slot widths of .0005, .0015, .003, .005, .007, and .009 (in fractions of the model chord). A regime of blowing mass flow was used for each of these configuration combinations that was bounded by the compressor maximum, mass-flow capacity for the wider slot widths and the critical pressure ratio for the narrower slot widths.

Electrical and Electronic Engineering

AD-289 486 OTS $13.50

Aeronca Mfg. Corp., Baltimore, Md.
ASPECTS OF GENERAL CONTROL THEORY, by R. W. Bass and P. Mendelson. Rept. on Contract AF 49(638)1003. Aug 62, 198p. AFOSR 2754; NASA N62-14839.

DESCRIPTORS: *Control systems, *Linear systems, Feedback, Synthesis.

Contents:
Introduction
Notation and Terminology
Matrix Analysis
Linear Systems
Piecewise Linear System: Continuous Systems (Saturating Control)
Piecewise Linear Systems: Discontinuous Systems (On-Off Control)
General Nonlinear Systems
Discontinuous Time-Optimal Control of Linear Plants
The Maximum Principle for Synthesis of Optimal Systems.

NASA N62-16980 OTS $8.10

Antenna Lab., Ohio State U. Research Foundation, Columbus.
ANALYSIS OF THE INTERFEROMETRIC SUB-MILLIMETER RADIOMETER, by Richard A. Williams and William S. C. Chang. Rept. on NASA Grant NsG-74-60. 23 July 62, 82p. 32 refs. Rept. no. 1093-9.

PB 163 177 OTS $3.60

Antenna Lab., Ohio State U. Research Foundation, Columbus.
EFFECTS OF RADOME DISCONTINUITIES ON ANTENNA PATTERNS, by Peter D. Kennedy, John R. Baechle, and Sinclair Chew. Interim engineering rept., 1 Apr-30 June 58, on Contract AF 30(602)1620. 1 July 58, 34p. 3 refs. Rept. no. 722-6; [RADC-TN-58-246] AD-148 903.

DESCRIPTORS: *Radomes, Electrical properties, Electromagnetic waves, Diffraction, *Antenna radiation patterns, Distortion, Design.

This report discusses recent progress made in developing methods of analysis of the electrical effects of rigid radomes and in investigating possible means for reducing the detrimental effects of such radomes. The analysis of irregular arrays is extended, and the digital computer program which was developed is described. Calculations to determine the optimum dielectric sleeve sizes for reducing the scattering from metal cylinders are presented along with some experimental results. The conducting cylinder has been studied in detail, and mathematical analyses and some numerical results are given. (Author)

PB 163 178 OTS $1.60

Antenna Lab., Ohio State U. Research Foundation, Columbus.
EFFECTS OF RADOME DISCONTINUITIES ON ANTENNA PATTERNS, by Peter D. Kennedy, John R. Baechle and others. Interim engineering rept., 1 Jan-31 Mar 59, on Contract AF 30(602)1620. 1 Apr 59, 20p. 3 refs. Rept. no. 722-10; RADC-TN-59-109; AD-212 615.

DESCRIPTORS: *Radomes, Electrical properties, Electromagnetic waves, Diffraction, *Antenna radiation patterns, Distortion, Design.

Analysis of the boresight shift caused by arrays of radome ribs has indicated that very small errors may be obtained with perfect antennas and regularly spaced ribs, but that the shift may be increased considerably by irregularities in the excitation of the antenna. This conclusion, if correct, may lead to ways of reducing the boresight shift which will be based on proper coordination of the antenna and radome designs. The equipment required for special tests is nearly completed, and experimental testing of the theory outlined in this report should proceed rapidly. (Author)

NASA N62-16591 OTS $1.60

Antenna Lab., Ohio State U. Research Foundation, Columbus.
RECEIVER TECHNIQUES AND DETECTORS FOR USE AT MILLIMETER AND SUBMILLIMETER WAVE LENGTHS, by W. S. C. Chang, R. A. Williams, and others. Semi-annual rept., 1 Mar-31 Aug 62, on NASA Grant NsG-74-60. 31 Aug 62, 13p. Rept. 1093-10.

PB 163 158 OTS $2.60

Cruft Lab., Harvard U., Cambridge, Mass.
THE SOLID STATE MASER, by J. O. Artman. Technical rept. on Contract Nonr-1866(28). 25 Apr 57, 28p. 22 refs. Technical rept. no. 264; AD-204 284.

DESCRIPTORS: *Masers, Microwave amplifiers, Preamplifiers, Operation, Probability, Molecular electronics, Solid state physics, Paramagnetic materials.

The principles of operation of Bloembergen's solid state maser are reviewed. The application of this device as a low-noise pre-amplifier in the microwave region are stressed. Microwave design parameters are discussed particularly as applicable to reflection cavity masers. The characteristics of desirable working substances are listed. Particular reference is made to the system under construction at Harvard University for use in the region about 1400 Mc/s. This portion of the electromagnetic spectrum is of great interest in radio astronomy, and radar. (Author)

AD-284 677 OTS $9.60

Electronics Research Lab., U. of California, Berkeley.
SYNTHESIS OF ACTIVE RC NETWORKS, by S. K. Mitra. Rept. on National Science Foundation Grant G-12142. 20 Mar 62, 117p. 55 refs. IER Series no. 60, Issue no. 442.

DESCRIPTORS: *Electrical networks, Impedance bridges, Negative resistance circuits, Synthesis, Variable capacitors, Matrix algebra, Functions, Polynomials, *Tunnel diodes.

A unified and systematic treatment of synthesis of active RC networks with a minimum number of active elements is presented. Consideration is given both to four-terminal active devices (e.g., negative impedance converters) and to two-terminal active elements (tunnel diodes). In the case of active RC networks with four-terminal active devices, only the synthesis aspect of such networks (one-ports, two-ports and n-ports) has been treated from the polynomial decomposition point of view. Several decomposition and partitioning forms, obtained by making extensive use of RC-LC transformations, are presented along with their application in the realization of network functions in known active RC configurations. Both the synthesis and the properties of the network functions are discussed in the case of tunnel diode:RC structures.

AD-272 567 OTS $6.60

IBM Command Control Center, Federal Systems Div., Kingston, N. Y.
PLANAR INTEGRATION OF THIN FILM FUNCTIONAL CIRCUIT UNITS, by R. L. Bullard, W. N. Carroll and others. Quarterly rept. no. 1 (Rept. no. 1), 1 May-30 June 61 and 1 Nov-30 Nov 61, on Contract DA 36-039-sc-87246. [1961] 66p. 6 refs.

DESCRIPTORS: *Subminiature electronic equipment, Electronic circuits, Electric connectors, *Thin films, Transistors, Diodes, Design, *Semiconductors, Vacuum systems, Evaporation, Soldering, Packaging, Circuits, Processing, Resistors, Cermets, Tests, Tools, Test equipment.

The preliminary method selected for integrating functional microminiature semiconductor devices to thin films is discussed along with the results obtained to date. A descripton is given of the special tools developed for this process and the testing procedures used during evaluation. A test subassembly is described which will be utilized during final test and evaluation of the process. A detailed description of the vacuum evaporation process is presented. A full description of the circuit design utilized on the functional assemblies is given.

AD-278 113 OTS $3.60

Martin Marietta Corp., Baltimore, Md.
REFLECTED ION BEAM RECORDING ON DIELECTRIC FILMS, by J. Litton. Rept. for 29 June 61-1 Mar 62, on Contract AF 30(602)2554. Mar 62, 37p. 22 refs. RADC-TDR-62-172.

DESCRIPTORS: *Recording systems, *Ion beams, Deposits, *Dielectric films, Ion sources, Ion accelerators, Ionization.

The theoretical studies and experimental work for a unique reflected ion beam recording technique are discussed. The results of literature surveys of particle deposition methods and positive ion generation techniques are presented along with a theoretical solution to the interelectrode field distribution in the specimen stage. Also presented is a description of the electron and ion guns used for recording, the results of a readout methods study, and the results of the ion deposition experiments. (Author)

AD-259 495 OTS $15.50

Molded Insulation Co., Philadelphia, Pa.
ULTRA-MINIATURE PRINTED CIRCUIT CONNECTORS, by Frederick D. Mitchell. Final rept., 1 Sep 58-30 Nov 59, on Contract DA 36-039-sc-78006. [1959] 233p.

DESCRIPTORS: *Subminiature electronic equipment, *Printed circuits, *Electronic circuits, *Electric connectors, Specifications, Plugs (Electricity), Electric terminals, Production, Design, Manufacturing methods, Reliability, Tests, Transistors.

The results are summarized of an intensive program leading to the development, production and complete evaluation of Ultra-Miniature Connectors for use with single sided printed circuit boards. Basic design requirements are discussed together with the integration of this development with the Micro-Module Program. As a result of these investigations, designs are available not only for the right-angled connectors originally called for on the contract, but also for the "straight through" or parallel type. Connectors developed exceed the requirements originally imposed and a more stringent specification is proposed and included in the report. Evaluation test data is included with analysis to support such a change. Production analysis is included together with manufacturing data. Reliability and Quality Assurance data has been developed and appropriate specifications are included together with supporting data. Suggestions are made as to possible future investigations in the area of ultra-miniature connectors for use with multi-layer printed circuit boards, further studies of plating to withstand abrasion, etc. (Author)

PB 181 517 OTS $2.50

Naval Research Lab., Washington, D. C.
THERMOELECTRICITY, by J. W. Davisson, Joseph Pasternak, and B. B. Rosenbaum (Bureau of Ships). Status rept. no. 10 (Final). Mar 63, 108p. NRL Memo. rept. 1404.

DESCRIPTORS: *Energy conversion, *Thermoelectricity, Materials, *Selenides, *Tellurides, Crystal structure, Electrical properties, *Semiconductors, Broadband, *Thermoelectric generators, Group V elements, Group VI elements, Metallurgy, *Semiconducting films, *Reactor fuel elements, *Cladding, Beryllium, Bonding, Uranium compounds, Oxides, *Strontium, Radioactive elements, *Navigational lights, *Thermocouples, *Solar cells, *Peltier effect, Heat exchangers

Contents:
Materials research and development for thermoelectric power generation
High-temperature broad-band semiconductors
High temperature semiconducting compounds for thermoelectric power generation
Structural investigations in thermoelectric materials
Thermoelectric properties of selenides and tellurides of groups VB and VIB metals and their solid solutions
High temperature metallurgy research on thermoelectric materials
Development of a semiconductor film-type thermocouple converter
Thermoelectric nuclear fuel element
Materials evaluation
Strontium-90 fueled thermoelectric generator power source for 6-watt U. S. Coast Guard light buoy
Development of a semiconductor film-type thermocouple energy converter
Solar thermoelectric panels
Peltier heat pumps; application parameters and device possibilities
Module improvement program
Preliminary studies of bonding of beryllium-clad UO_2 fuel elements
Research on materials, processes, and devices related to energy conversion
(See also PB 181 518)

PB 181 518 OTS $3.00

Naval Research Lab., Washington, D. C.
THERMOELECTRICITY. PART II. DEVICES, by J. W. Davisson, Joseph Pasternak, and B. B. Rosenbaum (Bureau of Ships). Status rept. no. 9, part 2. Jan 63, 163p. NRL Memo. rept. 1361; NASA N63-14441.

DESCRIPTORS: *Energy conversion, *Thermoelectricity, *Submarines, *Refrigeration systems, *Air conditioning equipment, *Thermoelectric generators, Portable, *Reactor cores, *Reactor fuels, Uranium compounds, Oxides, Zirconium, Lead compounds, Tellurides, *Cesium, Radioactive elements, Thermopiles, *Nuclear reactors, *Power reactors, *Solar cells, *Semiconductor devices, *Peltier effect, Cooling

The status of thermoelectric devices, including hardware and feasibility for various applications, is reported. The devices include: a silent system for food

storage refrigeration on SSN 593 submarines; a prototype, thermoelectric, refrigeration system for submarines; thermoelectric air-conditioning systems for submarines; a cesium-137 powered 5-watt thermoelectric generator for deep-sea applications; UO_2 (or UZr)-PbTe thermoelectric, direct-conversion nuclear reactors; a 3MW(e) nuclear thermoelectric powerplant for unattended deep submergence operation; an external 500-kw thermoelectric generator having a pressurized water reactor heat source; rigid thermoelectric panels for a 5-kw generator; two thermoelectric generators for "back-pack" carry; solar thermoelectric panels; and methods of thermoelectrically cooling semiconductor components. (NASA abstract) (See also AD-290 222)

PB 163 181 OTS $1.60

Philco Corp., Philadelphia, Pa.
ELECTROLYTIC CAPACITORS, by Paul H. Schmidt and Ruth F. Schwarz. Supplement to Monthly summary rept. no. 15 on Contract NObsr-72770. 31 Oct 59, 11p. 4 refs. Philco no. H-2177-F, Supplement; AD-231 587.

DESCRIPTORS: *Electrolytic capacitors, Design, Thin films, Electrical properties, Metallic compounds, Oxides.

See also PB 162 564

AD-272 864 OTS $2.60

Polytechnic Inst. of Brooklyn, N. Y.
FUEL CELL MATERIALS, by Harry P. Gregor. Quarterly progress rept. no. 4, 1 June-31 Aug 61, on Contract DA 36-039-sc-85384. [1961] 24p.

DESCRIPTORS: *Fuel cells, Materials, Power supplies, Electrolytic cells, Electrolytes, *Membranes, Stability, Design, Electroossmosis, Electrochemistry, Ion exchange, Polymer solutions, Methyl radicals, Vinyl radicals, Butyl radicals, Imides, Azo radicals, Iodides, Electrical properties, Resistance, Transport properties.

An improved cell for measuring the electroosmotic water transport across fuel cell electrolytes was constructed. An additional number of new homogeneous anion-permeable membranes of low ohmic resistance were prepared. Platinum black catalyst was incorporated into certain of these which were submitted for further evaluation. (Author)

AD-272 865 OTS $2.60

Polytechnic Inst. of Brooklyn, N. Y.
FUEL CELL MATERIALS, by Harry P. Gregor. Quarterly progress rept. no. 5, 1 Sep-30 Nov 61, on Contract DA 36-039-sc-85384. [1961] 29p.

DESCRIPTORS: *Fuel cells, Materials, *Power supplies, Electrolytic cells, Hydrogen, Oxygen, Fuels, Preparation, Ion exchange, *Membranes, Electrolytes, Films, Impregnation, Platinum, Catalysts, Organic solvents, Electrical properties, Resistance, Transport properties, Mechanical properties

The measurement of the functional behavior of catalyst impregnated ion-exchange membrane electrolytes with hydrogen and oxygen fuels was made in a modified cell. Known membranes were catalyst impregnated with an imprinting technique, and tested in this cell. Additional new membrane electrolytes were prepared. Samples were submitted for further testing. (Author) (See also AD-272 864)

AD-283 651 OTS $4.60

Polytechnic Inst. of Brooklyn, N. Y.
FUEL CELL MATERIALS, by Harry P. Gregor. Quarterly progress rept. no. 6, 1 Dec 61-28 Feb 62 (final rept. 1 Sep 60-28 Feb 62) on Contract DA 36-039-sc-85384. [1962] 48p.

DESCRIPTORS: *Fuel cells, *Power supplies, *Membranes, Materials, Catalysts, Electrolytes, Films, Polymers, Resins, Ion exchange, Hydrogen, Oxygen, Fluorination, Impregnation.

Measurement of the functional behavior of catalyst-impregnated ion-exchange membrane electrolytes in a modified H2-O2 fuel cell was made. An improved imprinting technique (the hot press method) was developed for membranes. New membrane electrolytes were prepared, including films with a fluorinated matrix polymer and films containing cross-linking resins for enhanced mechanical strength. Significant improvements were also made on the water-retaining properties of membrane electrolytes. (See also AD-272 865)

PB 163 160 OTS $8.60

Radio Corp. of America, Harrison, N. J.
DEVELOPMENT OF A 10-WATT, S-BAND TRAVELING-WAVE AMPLIFIER, by E. E. Bliss. Rept. for Mar 56-14 Dec 58, on Contract AF 33(600)32099. Apr 60, 94p. WADD Technical rept. 60-397; AD-247 158.

DESCRIPTORS: *Microwave amplifiers, *Traveling wave tubes, S band, Design, Helixes.

This report concerns the development of an S-band, medium-power, traveling-wave tube amplifier designated the RCA Developmental Type A-1063. The objective of this program was to design and develop a tube capable of delivering 10 watts of cw power output from 2.0 to 4.0 kmc with a gain of 20 db and with a small-signal gain of 25 db. Focusing was to be provided by periodic permanent magnets with the over-all size and weight of the packaged tube to be kept to a minimum. A further objective was that the tube be capable of operating under severe environmental conditions such as would be met in airborne operation. This program has demonstrated that tubes can be built with 10 watts of cw RF power output over an octave bandwidth with over twenty db of gain and that they are capable of normal operation over a temperature range of 250 degrees centigrade and under vibration of 15 g's from 10 to 2000 c. (Author)

PB 163 180 OTS $11.00

Raytheon Co., Waltham, Mass.
DESIGN AND DEVELOPMENT OF THE PLATINOTRON, AMPLITRON, AND STABILOTRON, by W. C. Brown. Final engineering rept., Volume I, 1 Aug 53-31 Dec 55, on Magnetron Study Project, Contract DA 36-039-sc-56644. 14 June 56, declassified 1 Sep 59. 146p. AD-95 538.

DESCRIPTORS: *Radar equipment, Microwave equipment, *Electron tubes, *Magnetrons, *Backward wave tubes, Electron beams, *Microwave oscillators, Stabilization systems, *Microwave amplifiers, Design, Circuits, Electrical properties, Radiofrequency spectroscopy.

This report concerns studies intended to gain more quantitative understanding of the characteristics of pulsed magnetron oscillators and other microwave power generators used in modern radar systems where high orders of frequency stability, pulse to pulse reproducibility, and starting reliability are needed. Design and development of the three new types of Microwave tubes, the platinotron, the stabilotron and the amplitron, are direct results of this project. (Author)

AD-277 526 OTS $3.60

Stanford Electronics Labs., Stanford U., Calif.
FABRICATION OF GALLIUM ARSENIDE SUBNANOSECOND SWITCHING DIODE, by H. C. Casey, Jr. Rept. on Contract DA 04-200-ORD-1087. May 62, 33p. 22 refs. Technical rept. no. 1802-1; SEL-62-066.

DESCRIPTORS: *Semiconductor devices, *Electronic switches, *Diodes (Semiconductor), Manufacturing methods, *Gallium compounds, *Arsenides, Impurities, Zinc, Electric connectors, Gold alloys, Tin alloys, Indium alloys, Electrical properties, Electric potential, Electric current, Capacitance.

Gallium arsenide has been used to develop a reproducible, stable, subnanosecond switching diode. The p-n junction was formed by diffusing zinc into n-type GaAs at 900°C for 2 min. Ohmic contact to the n-type GaAs was obtained by alloying 50 percent gold and 50 percent tin, while alloyed indium was used for the contact to the diffused p-layer. Zero-bias capacitance (including case) of 1.0 to 0.2 picofarads (pf) has been achieved by use of mesa geometry. This low capacitance requires junction diameters of about 0.0008 to 0.0018 in. These small mesas are formed by masking with Apiezon "W" wax and etching for approximately 1 min. All necessary steps in the fabrication process have been explored and are controllable. Preliminary results indicate that reliable and long-life operation can be expected. (Author)

AD-277 528 OTS $10.50

Stanford Electronics Labs., Stanford U., Calif.
THE STAIRCASE MASER: SIMULTANEOUS ADIABATIC RAPID PASSAGE IN MULTILEVEL PARAMAGNETIC CRYSTALS, by R. J. Morris. Rept. on Contract AF 33(616)7944. 22 Jan 62, 133p. 40 refs. Technical rept. no. 211-3; SEL-62-022.

DESCRIPTORS: *Masers, *Ruby, *Paramagnetic crystals, *Solid state physics, *Extremely high frequency, *Quantum mechanics, Nuclear magnetic resonance, Nuclear spins, Lattices, Electrons, Magnetic fields, Magnetic moments, Perturbation theory, Matrix algebra, Differential equations, Operators (Mathematics), Relaxation time, Silver, Thin films, X-band, K-band, Q-band.

Adiabatic rapid passage (ARP) is a pulsed method for achieving an inverted population distribution in paramagnetic spin systems. The staircase proposal was a suggested answer to the need for masers to amplify in the millimeter and, hopefully, submillimeter regions. In the staircase maser, ARP inversion is performed successively or simultaneously on several equally or nearly equally spaced energy levels. With three levels the method gives pulsed maser amplification at a frequency which is approximately twice the pump frequency. It thereby makes maser operation possible at a frequency which is roughly twice that of the highest-frequency-pump source available. This is in contrast to the conventional three-level c-w maser which gives operation at roughly one-half the highest available pump frequency. Because simultaneous ARP makes staircase-maser operation possible, the process is considered at length in this study.

AD-289 209 OTS $10.50

Stanford Electronics Lab., Stanford U., Calif.
TRANSIT-TIME MODULATION OF VARIABLE ARTIFICIAL DELAY LINES, by E. K. Wong. Rept. on Contract DA 36-039-sc-87300 May 62, 133p. 19 refs. Technical rept. 1610-1; SEL-62-077.

DESCRIPTORS: *Delay lines, *Semiconductor devices, *Diodes (Semiconductor), Modulation, *Waveform generators, *Phase modulation, Series, *Capacitors, Very high frequency.

Variable transit-time devices are capable of producing phase, frequency, and serrodyne modulation. An investigation has been made regarding the use of variable artificial lines with junction-diode capacitors as the variable elements to produce these forms of modulation. The variable artificial lines are considered under small carrier signal conditions so that linearizing approximations are applicable. Variable artificial lines with junction-diode capacitors are first analyzed using quasi-static approximations, which are quite valid for modulating frequencies much lower than the carrier frequency. A second part of this report considers the general steady-state analysis of linear, iterative, time-varying circuits, which, under certain conditions, are good approximations to variable artificial lines. A general solution is found for the steady-state response of a high-pass line with periodically time-varying capacitors.

PB 163 188 OTS $3.60

Stanford Research Inst. [Menlo Park] Calif.
DESIGN INTERFERENCE SUPPRESSION FILTERS, by Donald K. Weaver, Jr. Technical rept. no. 3 on Contract NOy-22272. Dec 51, 31p. 3 refs. SRI Proj. no. 336; ATI-196 750.

DESCRIPTORS: Design, Filters (Electromagnetic), *Low-pass filters, Synthesis, Interference, Suppressors.

This report describes the design of low-pass filters providing a controlled minimum attenuation in the stop band. Filters resulting from the design procedures given here use their elements in an efficient manner. Both m-derived and insertion loss methods of design are presented. A table is given of normalized filters which can be scaled to any cutoff frequency and to any impedance level. (Author)

Ordnance, Missiles, and Satellite Vehicles

NASA N63-13893 OTS $1.00

Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
AN EXPERIMENTAL INVESTIGATION IN AN ATMOSPHERE ENTRY SIMULATOR OF NYLON AS AN ABLATIVE MATERIAL FOR BALLISTIC MISSILES, by Gary H. Bowman and Raymond C. Savin. Dec 59, declassified 8 Feb 63, 35p. 20 refs. Rept. no. Technical memo. X-114.

NASA N63-15473 OTS $1.50

Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
STUDY OF INERTIAL NAVIGATION ERRORS DURING REENTRY TO THE EARTH'S ATMOSPHERE, by Q. M. Hansen, John S. White and others. May 63, 53p. 8 refs. Technical note D-1772.

NASA N63-13913 repriced OTS $1.25

Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
SUBSONIC AERODYNAMIC CHARACTERISTICS OF DISK RE-ENTRY CONFIGURATIONS WITH ELLIPTIC CROSS SECTIONS AND THICKNESS-DIAMETER RATIOS OF 0.225 AND 0.325, by Fred A. Demele and Jack J. Browson. May 61, declassified 8 Feb 63. 46p. 9 refs. Technical memo. X-566.

NASA N63-13904 repriced OTS $0.50

Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
A WIND-TUNNEL INVESTIGATION AT SUBSONIC AND LOW SUPERSONIC SPEEDS OF A RE-ENTRY VEHICLE WITH RETRACTABLE WINGS, by Willard G. Smith. Feb 61, declassified 8 Feb 63. 21p. 4 refs. Technical memo X-398.

PB 163 219 OTS $10.10

Bureau of [Naval Weapons] Washington, D. C.
A TREATISE ON RADIAL EXPANSION OF GUNS, by Carl F. Jeansen. Jan 38, declassified 5 Nov 53, 130p. TIP U-56682.

DESCRIPTORS: *Gun barrels, Manufacturing methods, Material removal, *Machining, *Forging, Failure (Mechanics), Shear stresses, Theory, Equations, Elasticity, Tensile properties, Heat treatment, *Pressure gages.

Contents:
Notes on theories and formulas for radial expansion
Formulas for computing and methods of manufacturing radially expanded guns.

NASA N63-13441 OTS $2.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
DEVELOPMENT OF STABLE TEMPERATURE CONTROL SURFACES FOR SPACECRAFT, by W. F. Carroll. Progress rept. no. 1 on NASA Contract NAS7-100. 20 Nov 62, 21p. 10 refs. JPL-TR-32-340.

NASA N63-14292 OTS $31.00

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
EARTH-VENUS TRAJECTORIES, by V. C. Clarke, Jr., R. Y. Roth, and others. Rept. on NASA Contract NAS7-100. 30 Jan 63, 789p. 9 refs. Technical memo. no. 33-99, Vol. 1, pt. B.

NASA N63-16445 OTS $1.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
A SIMPLIFIED STATISTICAL MODEL FOR MISSILE LAUNCHING - 1, by Carleton B. Solloway. Rept. on NASA Contract NAS7-100. 1 May 63, 11p. Technical rept. no. 32-431(Pt. 1).

NASA N63-13485 OTS $14.50

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
SPACE PROGRAMS SUMMARY NO. 37-18, VOLUME IV FOR THE PERIOD OCTOBER 1, 1962 TO DECEMBER 1, 1962. SUPPORTING RESEARCH AND ADVANCED DEVELOPMENT, by W. H. Pickering. Rept. on NASA Contract NAS7-100. 31 Dec 62, 212p. refs. JPL-SPS-37-18, Vol. IV.

NASA N63-13582 OTS $14.50

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
SPACE PROGRAMS SUMMARY NO. 37-19, VOLUME IV FOR THE PERIOD DECEMBER 1, 1962 TO JANUARY 31, 1963. SUPPORTING RESEARCH AND ADVANCED DEVELOPMENT, by W. H. Pickering. Rept. on NASA Contract NAS7-100. JPL-SPS-37-19, Vol. IV.

NASA N63-14902 OTS $9.10

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
SPACE PROGRAMS SUMMARY NO. 37-19, VOLUME VI FOR THE PERIOD NOVEMBER 1, 1962 TO JANUARY 31, 1963. SPACE EXPLORATION PROGRAMS AND SPACE SCIENCES, Rept. on NASA Contract NAS7-100. 28 Feb 63, 101p. 9 refs. JPL-SPS-37-19, Vol. VI.

NASA N63-13450 OTS $2.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
SYMBOLIC REPRESENTATION OF COMPLEX SYSTEMS, by J. S. Brady and Stuart Goff. Rept. on NASA Contract NAS7-100. 15 Jan 63, 27p. 2 refs. JPL-TR-32-390.

NASA N63-13901 repriced $1.00

Langley Research Center, National Aeronautics and Space Administration, Langley [Station] Va.
AERODYNAMIC HEATING TESTS OF MISSILE STABILIZERS IN A FREE JET AT MACH NUMBER 2, by Louis F. Vosteen. Sep 60, declassified 8 Feb 63. 34p. 2 refs. Technical memo. X-299.

NASA N63-13910 repriced OTS $0.50

Langley Research Center, National Aeronautics and Space Administration, Langley [Station] Va.
EFFECT OF LONGITUDINAL AND LATERAL CONTROLS ON AERODYNAMIC CHARACTERISTICS OF A WINGED REENTRY CONFIGURATION AT A MACH NUMBER OF 1.97 AND ANGLES OF ATTACK UP TO APPROXIMATELY 90°, by Gerald V. Foster. Feb 61, declassified 8 Feb 63. 13p. 3 refs. Technical memo. X-449.

NASA N63-13909 repriced OTS $1.00

Langley Research Center, National Aeronautics and Space Administration, Langley [Station] Va.
AN INVESTIGATION AT SUBSONIC SPEEDS OF THE LONGITUDINAL AERODYNAMIC CHARACTERISTICS AT ANGLES OF ATTACK FROM -4° TO 100° OF DELTA-WING REENTRY CONFIGURATIONS HAVING VERTICALLY DISPLACED AND CAMBERED WING-TIP PANELS, by Bernard Spencer, Jr. Feb 61, declassified 8 Feb 63. 34p. 10 refs. Technical memo. X-440.

NASA N63-12548 OTS $5.00

Langley Research Center, National Aeronautics and Space Administration, Langley Field, Va.
AN INVESTIGATION OF A 0.05-SCALE MODEL OF THE XSM-64A NAVAHO MISSILE AND BOOSTER AT SUPERSONIC MACH NUMBERS PART I - FORCE STUDY, by James D. Church and Nancy L. Taylor. Sept 59, declassified 1 Dec 62, 311p. 1 ref. Technical memo X-16.

NASA N63-12549 OTS $2.75

Langley Research Center, National Aeronautics and Space Administration, Langley Field, Va.
AN INVESTIGATION OF A 0.05-SCALE MODEL OF THE XSM-64A NAVAHO MISSILE AND BOOSTER AT SUPERSONIC MACH NUMBERS PART II - PRESSURE STUDY, by James D. Church and Nancy L. Taylor. Sept 59, declassified 1 Dec 62, 137p. 1 ref. Technical memo X-17.

NASA N63-12556 OTS $0.75

Langley Research Center, National Aeronautics and Space Administration, Langley Field, Va.
INVESTIGATION OF THE STATIC LONGITUDINAL STABILITY AND ROLL CHARACTERISTICS OF A THREE-STAGE MISSILE CONFIGURATION AT MACH NUMBERS FROM 1.77 TO 2.87, by Donald T. Gregory and Ausley B. Carraway. Oct 59, declassified 1 Dec 62, 30p. Technical memo X-124.

NASA N63-13902 repriced $0.50

Langley Research Center, National Aeronautics and Space Administration, Langley [Station] Va.
INVESTIGATION OF THE STATIC LONGITUDINAL STABILITY CHARACTERISTICS OF AN AIR-TO-SURFACE CANARD MISSILE CONFIGURATION IN THE TRANSONIC MACH NUMBER RANGE, by Gerald L. Hunt. Oct 60, declassified 8 Feb 63, 20p. 1 ref. Technical memo. X-305.

NASA N63-13981 OTS $0.50

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
MODEL INVESTIGATION OF WATER LANDINGS OF A WINGED REENTRY CONFIGURATION HAVING OUTBOARD FOLDING WING PANELS, by William W. Petynia. Dec 59, declassified 8 Feb 63. 20p. 4 refs. Technical memo. X-62.

NASA N63-13903 repriced $1.25

Langley Research Center, National Aeronautics and Space Administration, Langley [Station] Va.
SOME AERODYNAMIC AND CONTROL STUDIES OF LIFTING REENTRY CONFIGURATIONS AT ANGLES OF ATTACK UP TO 90° AT A MACH NUMBER OF 2.91, by Frank L. Clark and Joanna M. Evans. Nov 60, declassified 8 Feb 63. 49p. 2 refs. Technical memo. X-338.

NASA N63-13906 repriced OTS $0.75

Langley Research Center, National Aeronautics and Space Administration, Langley [Station] Va.
STATIC LONGITUDINAL AERODYNAMIC CHARACTERISTICS AT TRANSONIC SPEEDS OF A LENTICULAR-SHAPED REENTRY VEHICLE, by John P. Mugler, Jr. and Walter B. Olstad. Dec 60, declassified 8 Feb 63. 30p. 5 refs. Technical memo. X-423.

NASA N63-13908 repriced OTS $0.50

Langley Research Center, National Aeronautics and Space Administration, Langley [Station] Va.
STATIC STABILITY AND CONTROL CHARACTERISTICS AT LOW-SUBSONIC SPEEDS OF A LENTICULAR REENTRY CONFIGURATION, by George M. Ware. Dec 60, declassified 8 Feb 63. 18p. 3 refs. Technical memo. X-431.

NASA N63-13519 OTS $8.10

Northrop Space Labs., Hawthorne, Calif.
SELF-SEALING STRUCTURES FOR CONTROL OF THE METEOROID HAZARD TO SPACE VEHICLES, by Philip J. D'Anna, Roger M. Heitz, and others. Quarterly rept. no. 3, 1 Oct-31 Dec 62, on NASA Contract NASr-102. Jan 63, 83p. 3 refs. NSL-62-132-2

NASA N62-17561 OTS $10.50

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
EVALUATIONS OF SPACE VEHICLE SHIELDING, by N. F. Dow, S. P. Shen, and others. Rept. on NASA Contract NASr-34. Apr 62, 132p. 27 refs. Rept. no. R62SD31.

NASA N63-13482 OTS $8.10

Wilmot Castle Co., Rochester, N. Y.
STERILIZATION OF SPACE PROBE COMPONENTS, by Martin G. Koesterer. Final rept., 19 Apr 61-31 July 62 on NASA Contract NASr-31. 1962, 83p. 6 refs.

Sanitation and Safety Engineering

PB 181 519 OTS $2.75

Franklin Inst., Philadelphia, Pa.
SOIL THERMAL PROPERTIES: AN ANNOTATED BIBLIOGRAPHY, by Alec Peters and Norman Gentieu. Rept. on Thermal Study of Underground Air Ducts, Contract OCD-OS-62-58. Oct 62, 135p. 203 refs.

DESCRIPTORS: *Bibliographies, *Soil mechanics, *Soils, *Thermal conductivity, Measurement, *Moisture, *Underground structures, *Ventilation ducts, Design, *Civil engineering, Safety.

AD-275 196 OTS $1.60

Naval Civil Engineering Lab., Port Hueneme, Calif.
PERFORMANCE OF THE SWEDISH RAPID-CLOSING ANTI-BLAST VALVE, by E. N. Hellberg. 9 May 62, 15p. 3 refs. Technical note 439.

DESCRIPTORS: *Safety valves, *Exhaust valves, *Intake valves, *Ventilation, *Underground structures, Atomic bomb damage, Blast, Shock waves, Valves, Gas flow, Test facilities, Test methods, Climatic factors, Sweden.

A 14-inch diameter Swedish anti-blast valve was tested for air flow and weatherability. Air flows from 1830 to 3680 cfm produced pressure losses from 1.28 to 4.56 inches of water when air is drawn through the valve. Air flows from 1830 to 4750 cfm produced pressure losses from 0.25 to 2.56 inches of water when air is exhausted from the valve. Without the shear pin holding the closure disc fixed, fluttering became serious at air flows in excess of 900 cfm. The free movement of the closure disc was unaffected by ten months of outside storage and the valve in general was virtually rust-free. (Author)

MACHINERY, FABRICATION, AND ACCESSORY EQUIPMENT

NASA N63-13678 OTS $6.60

General Electric Co., Cincinnati, Ohio.
LOW VISCOSITY BEARING STABILITY INVESTIGATION. Quarterly rept. no, 4 for period ending 9 Nov 62 on NASA Contract NAS3-2111. [1962] 63p. 5 refs.

AD-297 881 OTS $3.60

National Aeronautical Establishment (Canada).
THE POTENTIAL USE OF HELICOPTERS FOR THE TRANSPORTATION OF LOGS, by A. D. Wood. Nov 62, 38p. 4 refs. Aeronautical rept. LR-363; NRC no. 7211.

DESCRIPTORS: *Air transportation, *Helicopters, *Forestry, Trees, Wood, Transportation, Economics, Costs, Industrial research.

Factors contributing to the probable cost of logging operations using helicopters are reviewed and the results of some recent experiments in the United States, where a skidding technique was investigated, are briefly discussed. While the widespread use of helicopters for logging appears unlikely for many years, there is an evident need for further systematic experiments to generate the data necessary for more reliable cost estimation and to serve as a guide in considering future technical developments in both the aircraft and forest industries. (Author)

Engines and Propulsion Systems

NASA N63-13883 OTS $1.75

Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
AN EXPERIMENTAL INVESTIGATION OF CIRCULAR INTERNAL-COMPRESSION INLETS WITH TRANSLATING CENTERBODIES EMPLOYING BOUNDARY-LAYER REMOVAL AT MACH NUMBERS FROM 0.85 TO 3.50, by Frank A. Pfyl and Earl C. Watson. Mar 59, 71p. 12 refs. MEMO. 2-19-59A.

PB 163 220 OTS $3.60

Applied Physics Lab., Johns Hopkins U., Silver Spring, Md.
TASK R. Quarterly progress rept. no. 1, 1 Apr-30 June 59, on Contract NOrd-7386. 7 July 59, 39p. 15 refs. Rept. no. TG 331-1; ARPA Order no. 22-59, Task 5; AD-219 985.

DESCRIPTORS: *Heat resistant materials, Rocket motors (Solid propellant), *Rocket motor nozzles, Fluid dynamic properties, Gases, *High temperature research, *Combustion, Reaction kinetics, *Flames, Methanes, Oxygen, Aerodynamic characteristics, *Thermal conductivity, Measurement, Wake, Laminar boundary layer, *Exhaust gases, Infrared spectroscopy, *Fluid mechanics.

A survey was made of the basic scientific problems involved in understanding and predicting the behavior of materials in high-temperature environments. Special emphasis was placed on problems of advanced solid propellant rockets. High-temperature kinetics are being studied by a detailed quantitative analysis of laminar flame structure. The rates of appearance or disappearance the stable species in a flame are being determined as a function of position, temperature, and chemical composition. Lean, CH_4-O flames are being analyzed at low pressures; tests were made to check reproducibility and unidimensionality of the flame. The point-source technique is to be adapted to the measurement of thermal conductivity of pure gases over a wide

range of temperatures. The dynamics of the high-speed gas flows occurring in solid propellant rocket nozzles are being investigated. Nozzle pressure measurements were made with a 26° total angle nozzle; a molybdenum insert was used for the throat section. Total head and static pressures indicated that the flow was essential by radial with an increase in Mach number from 2.85 at the center line to 2.94 at the edge of the boundary layer. The boundary layer total thickness was roughly determined as 0.040 in. for the station diameter of 1.5 inches. (DDC abstract)

PB 163 221 OTS $3.60

Applied Physics Lab., Johns Hopkins U., Silver Spring, Md.
TASK R. Quarterly progress rept. no. 2, 1 July-30 Sep 59, on Contract NOrd-7386. 21 Oct 59, 32p. 7 refs. Rept. no. TG 331-2; ARPA Order no. 22-59, Task 5; AD-227 765.

DESCRIPTORS: *Heat resistant materials, Rocket motors (Solid propellant), Fluid dynamic properties, Wind tunnels, Heat transfer, *Exhaust gases, Infrared spectroscopy, Gases, *High temperature research, *Combustion, Reaction kinetics, *Flames, Methanes, Oxygen, Aerodynamic characteristics, Enthalpy, *Thermal conductivity, Measurement, Wake, Laminar boundary layer, Nitrogen, Thermistors, *Fluid mechanics.

The approach taken is to obtain high temperature chemical kinetic information by means of the detailed analysis of laminar flame structure. The "final" set of data on temperature, composition, and aerodynamic profiles through a lean methane-oxygen flame at one-tenth atmosphere pressure is discussed, and the analysis in terms of conservation of matter and energy presented. Extension of a method previously developed at APL for the accurate measurement of high temperature molecular diffusivities to the measurement of thermal conductivity is described. The theory for both a point source and a line source of heat is given. Experimental results with both are presented. Special emphasis has been placed on the line source. This project aims at experimental measurements of the flow properties in a rocket nozzle employing a typical solid propellant. Non-equilibrium conditions, real gas effects, and heat transfer are important considerations. Some results on nozzle pressure surveys and spectrometer shakedown runs are presented. (Author) (See also PB 163 220)

PB 163 222 OTS $5.60

Applied Physics Lab., Johns Hopkins U., Silver Spring, Md.
TASK R. Quarterly progress rept. no. 3, 1 Oct-31 Dec 59, on Contract NOrd-7386. 22 Jan 60, 55p. 25 refs. Rept. no. TG 331-3; ARPA Order no. 22-59, Task 5; AD-237 930.

DESCRIPTORS: *Heat resistant materials, Rocket motors (Solid propellant), *Rocket motor nozzles, Fluid dynamic properties, Pressure, Pitot tubes, *Exhaust gases, Infrared spectroscopy, Cases, *High temperature research, *Combustion, Carbon compounds, Monoxides, Reaction kinetics, *Flames, Methanes, Oxygen, Aerodynamic characteristics, *Thermal conductivity, Measurement, Nitrogen, Helium, Wake, Laminar boundary layer, Dissociation, *Transport properties, Diffusion, *Fluid mechanics.

Net rates of appearance or disappearance for all the stable species found in the 1/10 atmosphere CH_4-O_2 flame are presented as profiles through the flame zone. The expected relations between these rates are given and shown to be borne out by the data. The over-all rate constant for the oxidation of CO is evaluated in terms of an empirical mechanism and shown to be essentially temperature-independent in the range 1650 to 1950°K. Corrections for the wake perturbation of the source wire are described and results on room temperature N and He are given. Methods of measuring diffusion coefficients and thermal conductivity in gases composed of labile atoms and their present molecules are being explored. Efforts are being made to derive chemical kinetic data by analyzing the concentration wake downstream of a point source trace gas injected into a laminar flow of a second gas with which it reacts. Pitot pressure surveys in nozzles of 12.5° and 26° total divergence angle of stations corresponding to the same expansion ratio showed appreciable differences which were attributed to chemical non-equilibrium effects. (See also PB 163 221)

PB 163 223 OTS $8.10

Applied Physics Lab., Johns Hopkins U., Silver Spring, Md.
TASK R. Quarterly progress rept. no. 4, 1 Jan-31 Mar 60, on Contract NOrd-7386. 25 Apr 60, 88p. 37 refs. Rept. no. TG 331-4; ARPA Order no. 22-59, Task 5; AD-237 931.

DESCRIPTORS: *Heat resistant materials, Rocket motors (Solid propellant), *Rocket motor nozzles, Fluid dynamic properties, Pressure, Pitot tubes, *Exhaust gases, Infrared spectroscopy, Gases, *High temperature research, *Combustion, Carbon compounds, Monoxides, Oxidation, Reaction kinetics, *Flames, Methanes, Oxygen, Hydroxides, Aerodynamic characteristics, *Thermal conductivity, Measurement, Nitrogen, Helium, *Furnaces, Nitrogen compound, Oxides, Deuterated compounds, Dissociation, *Transport properties, Wake. Laminar boundary layer, Hydrogen, Gas flow, Vapors, Condensation, *Phase studies, Barium compounds, *Fluid mechanics, *Pyrometers.

Comparisons of data on a CH_4O_2 flame at 1/10 and 1/20 atm demonstrated that the flame reactions are predominantly bimolecular. Rate constants for the CO-OH and CH_4-OH reactions were derived from the data. The room temperature thermal conductivities of N and He were determined using an intermittent off-on heat source. Measurements of relative O atom concentration were made by monitoring the light intensity caused by adding a trace of NO to an O-O_2 mixture. Difficulties were encountered in using CO as a tracer in O because of disproportionation of CO on the metal apparatus. Pitot pressure surveys in the 12.5° total angle nozzle were in good agreement with equilibrium flow calculations while those for a 26° nozzle were not. A study is being made between condensed metal oxides and typical gas phase combustion products. A system was devised for detecting the onset of condensation in the hot gas of a flat flame burner by means of light scattering. (See also PB 163 222)

PB 163 224 OTS $6.60

Applied Physics Lab., Johns Hopkins U., Silver Spring, Md.
TASK R. Quarterly progress rept. no. 4, 1 Apr-30 June 60, on Contract NOrd-7386. [1960] 62p. 30 refs. Rept. no. TG 331-5; ARPA Order no. 22-59, Task 5; AD-241 550.

DESCRIPTORS: *Heat resistant materials, Rocket motors (Solid propellant), *Rocket motor nozzles, Fluid dynamic properties, Pressure, Pitot tubes, Solid rocket propellants, *Exhaust gases, Infrared spectroscopy, Gases, *High temperature research, *Combustion, Reaction kinetics, *Flames, Methanes, Oxygen, Free radicals, Aerodynamic characteristics, *Thermal conductivity, Measurement, Wake, Laminar boundry layer, Nitrogen compounds, Oxides, Dissociation, *Transport properties, Hydrogen, Gas flow, *Fluid mechanics.

Information on profiles of free radical and atom concentration through a flame zone is needed. The technique being explored is to use a probe sampling procedure in which the labile radicals are rapidly mixed with a suitable scavenger gas to give a characteristic reaction product. The use of transverse temperature profiles and a free stream gas velocity computed from the total jet flow and area is advantageous. Results for the binary diffusion coefficient of the $O\text{-}O_2$ system at room temperature obtained by measuring the O-atom gradient in a tube with and without a gas flow are presented. Attempts to measure rates in the case where H_2 was injected into air at about 1000°K were unsuccessful. Aerodynamic surveys of the flow field in the nozzle were continued with measurements of pitot pressure profiles at several axial stations and static pressure recordings along the nozzle wall. The results of research are being applied to an analytical study of the complex chemical kinetics occurring in the flow of real propellant gases through nozzles. (See also PB 163 223)

PB 163 225 OTS $5.60

Applied Physics Lab., Johns Hopkins U., Silver Spring, Md.
TASK R. Quarterly progress rept. no. 6, 1 July-30 Sep 60, on Contract NOrd-7386. 25 Oct 60, 56p. 22 refs. Rept. no. TG 331-6; ARPA Order no. 22-59, Task 5; AD-246 418.

DESCRIPTORS: *Heat resistant materials, Rocket motors (Solid propellant), *Rocket motor nozzles, Fluid dynamic properties, Pressure, Pitot tubes, *Exhaust gases, Infrared spectroscopy, Gases, *High temperature research, *Combustion, Reaction kinetics, Free radicals, *Flames, Aerodynamic characteristics, *Thermal conductivity, Measurement, Nitrogen, Wake, Laminar boundary layer, Hydrogen, Helium, Dissociation, *Transport properties, Carbon compounds, Monoxides, Gas flow, *Fluid mechanics.

Work was concentrated on the design and construction of a scavenger probe for the sampling of atoms and free radicals in flames. Present efforts are being put on perfecting the transverse profile line source method for use at elevated temperature. The conditions required for the temperature and velocity profiles in the laminar jet are discussed, and some preliminary high temperature runs on N are presented. A revised version of the photometric apparatus for measuring the binary diffusion coefficient of the $O\text{-}O_2$ system which is more adaptable to high temperature use is described. It was decided to return to the $CO\text{-}O_2$ (with added H_2O vapor) system since the $H_2\text{-}O_2$ system was too rapid for the present apparatus limitations. Test results are presented for a transverse pitot pressure profile at the 1-inch-diameter station in both the 12.5- and 25-degree nozzles. (Author) (See also PB 163 224)

PB 163 226 OTS $4.60

Applied Physics Lab., Johns Hopkins U., Silver Spring, Md.
TASK R. Quarterly progress rept. no. 7, 1 Oct-31 Dec 60, on Contract NOrd-7386. [1962] 44p. 14 refs. Rept. no. TG 331-7; ARPA Order no. 22-59, Task 5; AD-251 708.

DESCRIPTORS: *Heat resistant materials, Rocket motors (Solid propellant), *Rocket motor nozzles, Fluid dynamic properties, Pressure, Pitot tubes, *Exhaust gases, Infrared spectroscopy, *Pyrometers, Gases, *High temperature research, *Combustion, Reaction kinetics, *Flames, Aerodynamic characteristics, Hydrogen, Absorption, *Thermal conductivity, Measurement, Gas flow, Velocity, Anemometers, Oxygen, Dissociation, *Transport properties, Thermocouples, *Fluid mechanics.

Work has continued on developing a scavenger probe technique for H-atoms. Extension of a method for the accurate measurement of high temperature molecular diffusion coefficients to the measurement of thermal conductivity is being attempted. Methods of measuring diffusion coefficients and thermal conductivity in gases composed of labile atoms and their present molecules are being explored. Pressure distributions at area ratios 1-3 in the 25° nozzle and 3-36 in the 12.5° nozzle are reported. Further development work with the infrared absorbtion spectrometer is described, as well as some preliminary observations with a new optical pyrometer. (See also PB 163 225)

NASA N63-12550 OTS $1.00

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio
COLD-AIR INVESTIGATION OF THREE VARIABLE-THROAT-AREA CONVERGENT-DIVERGENT NOZZLES, by John E. McAulay. Sept 59, declassified 1 Dec 62, 33p. 3 refs. Technical memo X-42.

NASA N63-14680 OTS $1.25

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
EFFECTS OF EXTERNAL STREAM ON THE PERFORMANCE OF ISENTROPIC PLUG-TYPE NOZZLES AT MACH NUMBERS OF 2.0, 1.8, AND 1.5, by Alfred S. Valerino, Robert F. Zappa, and Kaleel L. Abdalla. Mar 59, 43p. 6 refs. NASA MEMO 2-17-59E.

NASA N63-13887 OTS $1.00

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
EVALUATION OF INJECTOR PRINCIPLES IN A 2400-POUND-THRUST ROCKET ENGINE USING LIQUID OXYGEN AND LIQUID AMMONIA, by Robert C. Hendricks, Robert C. Ehlers, and others. Jan 59, 34p. 11 refs. NASA MEMO 12-11-58E.

NASA N62-16896 OTS $2.60

Marquardt Corp., Van Nuys, Calif.
PYROLYTIC GRAPHITE THRUST CHAMBER DEVELOPMENT, by C. D. Coulbert and J. G. Campbell. Quarterly progress rept. no. 3, 8 Dec 61-7 Mar 62, on NASA Contract NAS7-54. 22 Mar 62, 27p. PR-264-30

PB 163 194 OTS $4.60

National Research Corp., Cambridge, Mass.
DEVELOPMENT OF TANTALUM-TUNGSTEN ALLOYS FOR HIGH PERFORMANCE PROPULSION SYSTEM COMPONENTS, by M. L. Torti. Ta-W Quarterly rept. no. 2, 10 July-9 Oct 59, on Contract NOrd-18787. [1959] 42p. 4 refs. AD-229 486.

DESCRIPTORS: Rocket motors (Solid propellant), *Rocket motor nozzles, *Tantalum alloys, *Tungsten alloys, Carbides, Casting, Forging, Annealing, Crystallization, Grain structures (Metallurgy), Hardness, Fracture (Mechanics), Metallography, *Heat resistant metals and alloys.

Alloys ranging in composition from tantalum 10 percent tungsten to tantalum 98 percent tungsten were investigated. Successful solid propellant test firing data are reported on inserts of tantalum 10 and 20 percent tungsten. Fabrication procedures, recrystallization data, carbon effect, and hot hardness data are reported for the 10 percent tungsten alloy. Forgability experiments and hot hardnesses are reported for the 20 and 30 percent tungsten alloys. On the basis of small upset forging tests it appears that these alloys will forge well at 2500 to 3500°F. Attempts to cast 50 and 98 percent tungsten ingots were successful, but the alloys do not appear useable. Preliminary button investigations are noted. X-ray confirmation of the existence of TaC and Ta_2C surface layers after methane gas carburization of tantalum was obtained. (Author)
(See also PB 163 193)

PB 163 195 OTS $5.60

National Research Corp., Cambridge, Mass.
DEVELOPMENT OF TANTALUM-TUNGSTEN ALLOYS FOR HIGH PERFORMANCE PROPULSION SYSTEM COMPONENTS, by M. L. Torti. Ta-W Quarterly rept. no. 3, 10 Oct 59-9 Jan 60, on Contract NOrd-18789. [1960] 57p. 5 refs. AD-234 835.

DESCRIPTORS: Rocket motors (Solid propellant), *Rocket motor nozzles, *Heat resistant metals and alloys, *Tantalum alloys, *Tungsten alloys, Carbides, Sheets, Electric furnaces, Electrodes, Casting, Forging, Annealing, Erosion, Tensile properties, Grain structures (Metallurgy), Fracture (Mechanics), Hardness, Ductility.

Complete alloying by a single arc-melt of a pressed-powder electrode was confirmed by an electron microprobe analysis. No erosion was observed after solid propellant test firings of tantalum-10 and 20 per cent tungsten inserts. The more severe jetavator test configuration showed a marked decrease in erosion as the tungsten content was increased from 10 to 20 and from 20 to 30 per cent. Fabrication procedures have been developed for the production of excellent quality 60 and 10 mil sheet of 90 tantalum 10 tungsten. High temperature strength is markedly increased over pure tantalum. Forgeability experiments and hot hardnesses are reported for the 20 and 30 per cent tungsten alloys. Procedures have been developed to produce uniform layers of tantalum carbide of predetermined thicknesses by methane gas carburization of pure tantalum. (See also PB 163 194)

PB 163 196 OTS $5.60

National Research Corp., Cambridge, Mass.
DEVELOPMENT OF TANTALUM-TUNGSTEN ALLOYS FOR HIGH PERFORMANCE PROPULSION SYSTEM COMPONENTS, by M. L. Torti. Ta-W Quarterly rept. no. 4, 10 Jan-9 Apr 60, on Contract NOrd-18787. 4 refs. AD-240 183.

DESCRIPTORS: Rocket motors (Solid propellant), *Rocket motor nozzles, *Heat resistant metals and alloys, *Tantalum alloys, *Tungsten alloys, Casting, Forging, Extrusion, Welding, Cold working, Carbides, Sheets, Tensile properties, Brittleness, Ductility, Erosion, Grain structures (Metallurgy), Cold-working

The successful firing of a thin-walled tantalum-20% tungsten nozzle is reported. Nozzle insert blanks containing from 15 to 30% tungsten have been cast and are awaiting testing. Jetavator bar test firings show no variation in erosion with grain size or cold work for tantalum-10% tungsten. Extrusion investigations are underway for the tantalum-10 to 20% tungsten alloys an and billets have been prepared. The tensile strength and bend ductility of welds in tantalum-10% tungsten sheet are reported. The effect of carbon upon the microstructure of tantalum-10% tungsten was investigated. Nozzle inserts have been carburized and are awaiting testing. (Author) (See also PB 163 195)

PB 163 197 OTS $7.60

National Research Corp., Cambridge, Mass.
DEVELOPMENT OF TANTALUM-TUNGSTEN ALLOYS FOR HIGH PERFORMANCE PROPULSION SYSTEM COMPONENTS, by M. L. Torti. Ta-W Quarterly rept. no. 5, 10 Apr-9 July 60, on Contract NOrd-18787. [1960] 77p. 4 refs. AD-246 436.

DESCRIPTORS: Rocket motors (Solid propellant), *Rocket motor nozzles, *Heat resistant metals and alloys, *Tantalum alloys, *Tungsten alloys, Carbides, Extrusion, Annealing, Cold-working, Ductility, Hardness, Tensile properties, Grain structures (Metallurgy), Metallography

Billets of tantalum-10, 15, and 20 tungsten were successfully extruded at the WADD extrusion facility. The recrystallization temperature was fixed at 1600 degrees C. for the 15 and 20%W alloys. Substantial room temperature ductility is observed in the annealed state for both the 15 and 20% alloys. Hot hardnesses were completed on the entire tantalum tungsten system up to 1200 degrees C. As the testing temperature was raised, the alloys containing more than 20% tungsten showed a marked hardness increase over pure tungsten. A test firing of a carburized pure tantalum nozzle failed when the carbide was penetrated. Improved analytical procedures for tungsten in tantalum have been developed. High temperature testing of 90 tantalum-10 tungsten sheet shows a marked increase in strength with increasing strain rate. The effect of carbon upon the microstructure of 90 tantalum-10 tungsten is reported. (Author) (See also PB 163 196)

PB 163 198 OTS $3.60

National Research Corp., Cambridge, Mass.
DEVELOPMENT OF TANTLUM-TUNGSTEN ALLOYS FOR HIGH PERFORMANCE PROPULSION SYSTEM COMPONENTS, by M. L. Torti. Ta-W Quarterly rept. no. 6, 10 July-9 Oct 60, on Contract NOrd-18787. [1960] 32p. 4 refs. AD-252 217.

DESCRIPTORS: Rocket motors (Solid propellant), *Rocket motor nozzles, *Heat resistant metals and alloys, *Tantalum alloys, *Tungsten alloys, *Hafnium alloys, Carbides, Sheets, Erosion, Casting, Extrusion, Annealing, Machining, Forging, Cladding, Brittleness, Crystallization, Grain structures (Metallurgy), Fracture (Mechanics), Vapor plating, Aluminum coatings, Yttrium, Carbon alloys, Zirconium alloys, Tensile properties.

A pure Ta rocket nozzle insert carburized to a depth of 0.032 in. showed no erosion after a 60-sec test firing. Oxygen embrittlement was a serious problem at forging temperatures required for the higher W content Ta alloys. Hammer forging of Ta-15 to 20% W recrystallized extrusions conditioned by etching, turning and spot grinding was conducted at 3000 to 3300 F in an Ar atmosphere. Vacuum annealed extrusions upset in a forge press exhibited little surface cracking which was severe on as-cast speciments. Clad (pure Ta) and vacuum coated (Al) billets of Ta-20% W were upset forged with a 12,000-lb hammer at 3000 F; the Ta cladding split and would be unsuitable for closed die forging; the Al coating resisted oxidation and sub-surface embrittlement during heating prior to forging. Ta-10% W and Ta-10% Hf were cast and evaluated. (DDC abstract) (See also PB 163 197)

PB 163 193 OTS $1.10

National Research Corp., Cambridge, Mass.
TANTALUM TUNGSTEN ALLOYS, by M. L. Torti. Ta-W Quarterly rept. no. 1, 10 Apr-9 July 59, on Contract NOrd-18787. [1959] 8p. 4 refs. AD-225 407.

DESCRIPTORS: Rocket motors (Solid propellant), *Rocket motor nozzles, *Heat resistant metals and alloys, *Tantalum alloys, *Tungsten alloys, Carbides, Casting, Forging, Metallography, Chemical analysis, Fracture (Mechanics).

The program is oriented toward investigating the properties of, and fabrication procedures necessary for, the production of rocket nozzle inserts made of Ta and Ta-W alloys coated with Ta carbide. The entire Ta-W system will be surveyed by the vacuum-arc casting of ingots from which small nozzles will be machined. Three-in.-diam ingots of 10, 20 and 30% W in Ta were cast without difficulty. Preliminary metallographic examination disclosed no unalloyed W particles nor gross inhomogenities. Samples of the 20 and 30% W alloy were single-blow upset forged to a 50% reduction in height. The samples were coated with a refractory-base material to provide protection from oxidation, heated in an open, gas-fired furnace, and forged at 2500° to 2700°F. All of these samples forged well with no interior cracking. A 10% W alloy ingot cracked in the latter stages of forging. Tantalum samples were carburized for various times and temperatures. Various samples of the surface and interiors of the specimens were analyzed for C, O, and N. The C content of the interior increased rapidly as the carburizing temperature was increased. No significant O or N pickup occurred, ensuring that the observed layers were true carbides. (DDC abstract)

PB 163 208 OTS $3.60

Perkin-Elmer Corp., Norwalk, Conn.
DEVELOPMENT OF AN EXPERIMENTAL GAS RADIATION PYROMETER, by Stanley A. Dolin and Eugene A. Jackson. Final engineering rept., 11 Oct 56-31 Oct 57, on Temperature Sensing Systems, Contract AF 33(600)30130. Jan 59, 36p. WADC Technical rept. 56-360, Part II; AD-207 240.

DESCRIPTORS: *Jet engines, Afterburners, *Exhaust gases, Temperature, Measurement, Temperature sensitive elements, *Radiation pyrometers, Design, Infrared windows, Containers, Silver, Brazing, Bonding, *Thermopiles, Electric connectors, Seals (Stoppers).

Investigation was made on methods of gas radiation pyrometry which are applicable to measurement of temperature of exhaust gases of jet engines. Particular emphasis was directed towards development of an instrument that would withstand an ambient temperature of 1500°F while subjected to vibrational stresses up to 100 g's. Catagories investigated for construction of a high output hermetically sealed unit included windows, ceramic to metal seals, electrical leads, and thermopile detectors. Experimental models have been constructed and evaluated on the afterburner of a J-47 engine. Millivolt level outputs were recorded while measuring flames up to 3200°F. (Author) (See also PB 151 031)

Manufacturing Equipment and Processes

AD-297 780 OTS $8.10

Lockheed Aircraft Corp., Sunnyvale, Calif.
EXPLOSIVE METAL FORMING: AN ANNOTATED BIBLIOGRAPHY, comp. by Helen M. Abbott. Feb 63, 82p. 219 refs. Special Bibliography SB-62-45; Rept. no. 8-19-62-10.

DESCRIPTORS: *Material forming, *Explosive forming, Chemical milling, Electroforming, Explosives, Bonding, Forging, Hardening, Welding, Shock waves, Metals, Alloys, *Bibliographies, *Abstracts.

This bibliography consists of 219 selected references on explosive forming of materials. Information concerning explosive forming techniques, possible applications of the process and types of materials formed into various configurations was compiled. This collection of references supplements other published bibliographies and provides coverage of material from 1960 through September 1962.

AD-276 915 OTS $5.60

Materials Advisory Board, National Research Council, Washington, D. C.
STATE OF THE ART ON MACHINING. Progress rept. no. 5 by The Panel on Machining of the Committee on the Development of Manufacturing Processes for Aerospace Materials. 1 May 62, 52p. Rept. no. MAB-139-M(M5).

DESCRIPTORS: *Material removal, *Machining, *Chemical milling, Spark machining, Ion beams, Abrasive blasting, Electroerosive machining, Ultrasonic radiation, Electron beams, *Alloys, Manufacturing methods, *Ceramic materials, Production, Processing, Cermets, Cutting tools, Cutting fluids, Quality control, Statistical analysis.

The Panel on Machining has reviewed the areas of conventional material removal equipment, conventional material removal processes, and alternative methods of material removal. In this report, it presents its findings with regard to the state of the art, major problem areas, and process growth potentials for the 1965-1980 period, as applicable to aerospace problems in the above three areas. In conducting this review, the panel has drawn on findings of its previous task force surveys on cutting tool materials, alternative methods for machining, and numerically controlled machining covered by earlier reports of the panel. Three major problem areas have been recognized, namely: (1) A need for increased versatility in material removal equipment to produce small quantities of very complex parts utilizing a great diversity of materials. (2) A need for closer tolerances on machined parts, and (3) A need for increased ability to machine high-strength, heat resisting materials.

MATERIALS

NASA N63-13520 OTS $3.60

National Beryllia Corp., Haskell, N. J.
RESEARCH ON LOW DENSITY THERMAL INSULATION MATERIALS FOR USE ABOVE 3000° F, by Karsten H. Styhr, Jr., Philip S. Hessinger, and others. Quarterly rept. no. 3, 1 Oct-31 Dec 62, on NASA Contract NASr-99. [1962] 32p. 5 refs.

PB 163 162 OTS $5.60

Quantum, Inc., Wallingford, Conn.
THE FORMATION OF NEW POLYMERS USING IONIZING RADIATION, by R. F. Horan. Final rept., 12 Sep 58-12 Sep 59, on Radiation Polymerization; A feasibility Study for Specific Applications, Contract DA 44-009-eng-3723. [1959] 53p. 25 refs. AD-231 270.

DESCRIPTORS: *Radiation chemistry, Polymers, *Heat resistant plastics, *Plastic coatings, Production, *Phosphonitrile chlorides, *Vinyl plastics, Vinyl radicals, *Silanes, Cyclohexane derivatives, *Silicones, Ferrocenes, Dienes, Methyl radicals, Allyl radicals, Ethers, *Decaboranes, *Cyanuric acid, Phenyl radicals, Chlorides, *Tin compounds, *Metalorganic compounds, Butyl radicals, Cadmium compounds, Magnesium compounds, *Chlorocarbons, Polymerization, Infrared spectroscopy.

The objective of this program was to investigate the effect of gamma radiation as a tool for the synthesis of new polymer materials; specifically polymer materials useful as structural plastics at elevated temperatures. There are reported some 43 experiments from which 15 polymer products resulted from exposure to the ionizing gamma radiation from a Cobalt 60 source. Of the 15 fifteen polymer products, 6 have a melting or decomposition temperature greater than 300°C. The class of polymers represented by the type compounds triallylcyanurate-phosphonitrillic chloride and triallylcyanurate-vinyl stannanes showed most promise. However, no extensive physical or chemical analyses were performed on the irradiation products. (Author) (See also PB 152 649)

Ceramics and Refractories

NASA N63-13289 OTS $1.60

Culver City, Calif.
DEVELOPMENT OF REFRACTORY FABRICS, by L. E. Gates and W. E. Lent. Quarterly rept. no. 5, 3 Mar-2 June 62, NASA Contract NAS8-50. 15 June 62, 20p.

PB 163 231 OTS $1.60

Southwest Research Inst., San Antonio, Tex.
PARAMETRIC STUDIES OF METAL FIBER REINFORCED CERAMIC COMPOSITE MATERIALS, by Elbridge Z. Stowell and Tien-Shih Liu. Bimonthly rept. no. 3, 8 May-7 July 60, on Contract NOas 60-6077-c. 8 July 60, 14p. 4 refs. AD-240 435.

DESCRIPTORS: *Composite materials, *Ceramic materials, Reinforcing materials, *Metallic textiles, Fibers, Mechanical properties, *Tensile properties, Stresses, *Refractory materials, *Oxides, Creep

The strength of composite materials when stressed at an angle to the fiber reinforcements is considered in terms of the angles involved and certain strength properties of the fibers and the matrix. A discussion is made on refractory oxides at high temperatures. (Author) (See also PB 163 230)

PB 163 232 OTS $1.60

Southwest Research Inst., San Antonio, Tex.
PARAMETRIC STUDIES OF METAL FIBER REINFORCED CERAMIC COMPOSITE MATERIALS, by Elbridge Z. Stowell and Tien-Shih Liu. Bimonthly rept. no. 5, 8 Sep-7 Nov 60, on Contract NOas-60-6077-c. 8 Nov 60, 20p. 16 refs. AD-247 327.

DESCRIPTORS: *Composite materials, *Ceramic materials, Reinforcing materials, *Metallic textiles, Fibers, *Beams (Structural), Deformation, Stresses, Distribution, Viscosity, Elasticity, *Refractory materials, *Oxides, *Heat-resistant metals and alloys, Physical properties, Tables.

The stress distribution at elevated temperatures of a MFRC beam under a constant bending moment is calculated on the basis of a viscoelastic material. It is shown that there will be substantial changes in the stress distribution with time. Summary tables are presented for mixed oxides and for pure metals with melting points above 1649°C (3000°F). (Author) (See also PB 163 231)

PB 163 233 OTS $8.10

Southwest Research Inst., San Antonio, Tex.
PARAMETRIC STUDIES OF METAL FIBER REINFORCED CERAMIC COMPOSITE MATERIALS, by Tien-Shih Liu and Elbridge Z. Stowell. Final rept., Jan 60-Jan 61, on Contract NOas-60-6077-c. 26 Jan 61, 83p. 54 refs. AD-252 916.

DESCRIPTORS: *Composite materials, *Ceramic materials, Reinforcing materials, *Metallic textiles, Fibers, High temperature research, Mechanical properties, Stresses, Distribution, Tensile properties, Viscosity, Elasticity, Creep, *Beams (Structural), *Heat resistant metals and alloys, *Refractory materials, *Oxides, *Carbides, *Borides, *Nitrides, *Sulfides, *Silicides, Single crystals, *Whiskers (Crystallography), Physical properties, Tables.

The purpose of this program was to conduct a theoretical study of the various parameters which affect the mechanical characteristics of metal fiber reinforced ceramic composite materials. In addition, a survey of properties of potential fiber and matrix materials was made so that promising combinations needing intensive investigation can be defined in specific terms. Certain room temperature mechanical behavior of metal fiber reinforced ceramics (MFRC) were predicted using an inclusion concept and from geometric, elastic, statistical distribution and plastic strength considerations. Certain elevated temperature mechanical behaviors of MFRC were predicted using a universal visco-elastic concept. A survey of pertinent physical, chemical and mechanical properties was made on refractory metals, metal oxides, carbides, borides, nitrides, silicides, sulfides and single crystal whiskers. (Author) (See also PB 163 232)

PB 163 230 OTS $1.60

Southwest Research Inst., San Antonio, Tex.
PARAMETRIC STUDIES OF METAL FIBER REINFORCED CERAMIC COMPOSITE MATERIALS, by Elbridge Z. Stowell and Tein-Shih Liu. Interim rept. no. 1, 8 Jan-7 Mar 60, on Contract NOas 60-6077-c. 8 Mar 60, 14p. 2 refs. AD-234 887.

DESCRIPTORS: *Composite materials, *Ceramic materials, Reinforcing materials, *Metallic textiles, Fibers, Physical properties, Mechanical properties, Stresses

Theoretical discussion was given of probable effects of metallic fibers when embedded in ceramic materials. From geometircal and elastic considerations certain conclusions were drawn. Work was started on a survey of pertinent physical and mechanical properties of potential ceramic materials and metal fibers. (Author)

Fuels, Lubricants, and Hydraulic Fluids

AD-288 166 OTS $4.60

General Applied Science Labs., Inc., Westbury, N.Y.
A THEORETICAL ANALYSIS OF THE TURBULENT MIXING OF REACTIVE GASES WITH APPLICATION TO THE SUPERSONIC COMBUSTION OF HYDROGEN, by Paul A. Libby. Rept. on Contract AF 49(638)991. June 61, 44p. 28 refs. Technical rept. no. 242; AFOSR TN-752; NASA N62-12947.

DESCRIPTORS: *Hydrogen, Supersonics, Axially symmetric flow, Turbulent flow, Jet mixing flow, Compressible flow, Aerodynamics, Hypervelocity vehicles, Jet engines, *Combustion.

The turbulent mixing of an axisymmetric jet of a reactive gas is considered. By assuming a convenient model for the compressible eddy viscosity the momentum equation is reduced to a form amenable to approximate solution. The resulting velocity distribution in both incompressible and compressible flows is compared with experiment and found to be in reasonable agreement therewith. The usual assumptions with respect to chemical behavior, namely either frozen or equilibrium flow, and to unity Lewis numbers and Prandtl number are employed. The theoretical results for chemical equilibrium are compared to experimental data from low speed hydrogen flames and are shown to agree reasonably well therewith. A numerical example of interest in connection with a hypersonic, air-breathing vehicle is carried out in detail. (Author)

NASA N63-13768 OTS $2.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
THE EFFECTS OF MOISTURE ON THE DYNAMIC MECHANICAL PROPERTIES OF AMMONIUM PERCHLORATE - POLYURETHANE PROPELLANTS, by Robert F. Landel and B. G. Moser. Rept. on NASA Contract NAS7-100. 26 Feb 63, 22p. 8 refs. JPL-TR-32-389.

NASA N63-16443 OTS $8.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
PERFORMANCE CALCULATIONS FOR MONOPROPELLANT HYDRAZINE AND MONOPROPELLANT HYDRAZINE-HYDRAZINE NITRATE MIXTURES, by Donald H. Lee. Rept. on NASA Contract NAS7-100. 3 Dec 62, 92p. 9 refs. Technical rept. no. 32-348.

NASA N62-10095 OTS $0.50

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
A PHOTOGRAPHIC STUDY OF LIQUID HYDROGEN UNDER SIMULATED ZERO GRAVITY CONDITIONS, by Irving Brazinsky and Solomon Weiss. Feb 62, 16p. 5 refs. Technical memo. X-479.

PB 163 189 OTS $8.60

Southwest Research Inst., San Antonio, Tex.
DEVELOPMENT OF TEST METHODS FOR ANTI-SEIZE COMPOUNDS, by J. W. Cunningham. Rept. on Contract AF 33(038)22805. May 52, 98p. 128 refs. WADC Technical rept. 52-102; ATI-171 678.

DESCRIPTORS: *Antiseize compounds, Test methods, Metals, Bonding, Inhibition, Heat resistant materials, Oxygen equipment, Liquefied gases, Bibliographies.

The seizure of threaded connections and other tight fits was found to result from galling of the contacting surfaces. A quantitative method was developed for measuring the galling characteristics of standard metal surfaces under controlled conditions. Anti-seize compounds can be evaluated by observing their effect on these measured characteristics. This basic test method can be used to evaluate anti-seize compounds for:

(1) High temperature service (1200° - 2000°F)
(2) Aircraft oxygen system service
(3) Liquid oxygen system service
(4) Similar specific applications.

NASA N63-13630 OTS $1.60

Southwest Research Inst., San Antonio, Tex.
LIQUID SLOSHING IN 45° SECTOR COMPARTMENTED CYLINDRICAL TANKS, by H. Norman Abramson, Wen-Hwa Chu, and others. Technical rept. no. 3 on NASA Contract NAS8-1555. 1 Nov 62, 16p. 5 refs.

MATHEMATICS

AD-282 456 OTS $3.60

Courant Inst. of Mathematical Sciences, New York U., N. Y.
A NEW PROOF OF TORELLI'S THEOREM, by Henrik H. Martens. Rept. on Contract DA-ARO-(D)-31-124-G156. June 62, 32p. 11 refs. Rept. no. IMM-NYU 298; AROD no. 247:55.

DESCRIPTORS: *Algebraic topology, *Algebraic geometry, Matrix algebra.

Modern proofs of Torelli's theorem, valid in the abstract case, have been given by Weil Andreotti and Matsusaka. All of these proofs make extensive use of the methods of algebraic geometry. The primary object of this paper is to give an analytically formulated proof based on results contained in the standard texts on the theory of Riemann surfaces, and on a theorem of Riemann regarding the vanishing of the first-order theta-function.

AD-279 083 OTS $4.60

[Courant] Inst. of Mathematical Sciences, New York U., N. Y.
TRIAL AND ERROR PREDICATES AND THE SOLUTION TO A PROBLEM OF MOSTOWSKI'S, by Hilary Putnam. Rept. on Contract AF 49(638)777. 8 June 61, 44p. 7 refs. Rept. on IMM-NYU 290; AFOSR 817.

DESCRIPTORS: *Metamathematics, Mathematical logic.

It is proved that every consistent formula of quantification theory has a model in Mostowski's field of sets. (Author)

AD-296 284 OT $2.60

Electronics Research Lab., U. of California, Berkeley.
A MINIMAL COST PROBLEM IN DISCRETE-STATE SYSTEMS, by P. H. Schottler. Rept. on National Science Foundation Grant G-9106. 29 June 61, 30p. 3 refs. IER Series no. 60, Issue no. 378.

DESCRIPTORS: *Linear programming, *Probability, *Costs, *Programming (Computers), Linear systems, Statistical distributions, Statistical processes, Matrix algebra, Special functions, Functions, Sequential analysis, Control systems, Distribution, Analysis, Theory.

This report is concerned with a sequential control problem in a discrete-state probabilistic system. The problem is to find an input u_t which is to be applied when the system is in state s_t ($t = 0, 1, 2, \ldots$) in such a way as to minimize the expected cost of transition for the system from an arbitrary initial state to a specified terminal state (target state). The problem is solved by the use of dynamic programming. (Author)

AD-284 408 OTS $4.60

Electronics Research Lab., U. of California, Berkeley.
OPTIMUM EXPANSION POLICIES FOR MULTICOMPONENT STOCHASTIC SYSTEMS, I, by Y. Sekine. Rept. on National Science Foundation Grant G-15965. 17 Jan 62, 42p. 7 refs. IER Series no. 60, Issue no. 430.

DESCRIPTORS: *Statistical processes, *Probability, *Statistical distribution, *Integral transforms, *Statistical functions, *Communications theory, Operations research.

The objective of this research is to develop theoretical techniques for optimal operation and planning of large scale complexes, such as power systems with randomly varying elements, communication systems, transportation systems, etc. The system is assumed to occupy one of a finite or infinite number of discrete states in its state space. The property of each state is described by two parameters, the transition probability from one state to another and the probability distribution of the duration of each state. Part I of this report deals with the various probabilistic aspects of the behavior of such systems, while Part II is given over to a discussion of a complex system which consists of elementary systems, each of which is defined in a manner similar to that used in Part I. Particular attention is given to the reduction of a complex system to an equivalent simple system. Further problems concerning the effects of addition of a new elementary system to the existing complex system will be treated in Part III. (Author)

AD-289 185 OTS $3.60

Institute for Fluid Dynamics and Applied Mathematics, U. of Maryland, College Park.
BOUNDS ON THE TRUNCATION ERROR BY FINITE DIFFERENCES FOR THE GOURSAT PROBLEM, by A. K. Aziz (Georgetown U.) and B. E. Hubbard. Rept. on Contract AF 49(638)228 and NSF Grant G-17826. May 62, 32p. 20 refs. Technical note BN-289; AFOSR-2727; NASA N63-11567.

DESCRIPTORS: *Analog systems, *Boundary layer control systems, Difference equations, Errors, Linear systems.

A finite difference analogue is formulated for the boundary value problem $U_{xy} = f(x, y, U_x, U_y, U)$, $U(x, 0) = \varphi(x)$, $U(0, y) = \psi(y)$. For the linear case $U_{xy}(x, y) + a(x, y)\,U_x(x, y) + b(x, y)U_y(x, y) + c(x, y)U(x, y) = d(x, y)$ a finite difference analogue of Riemann's function is developed. It is shown that the the truncation error is bounded explicitly in terms of the data of the problem, which is of $O(h^2)$, where h is the mesh size. Bounds of the same order are obtained for the error in approximating the derivatives U_x, U_y, and U_{xy}. Similar results are derived for the nonlinear case if f satisfies certain continuity and differentiability conditions. (Author)

AD-295 637 OTS $3.60

New York U., N. Y.
INTEGRATION OF A SET OF SIMULTANEOUS ORDINARY DIFFERENTIAL EQUATIONS SUBJECT TO NUMERICAL INDETERMINACY, by E. S. Campbell and L. M. Schalit. Rept. on Contract AF 49(638)169. July 61, 31p. 7 refs. AFOSR TN-60-699.

DESCRIPTORS: *Differential equations, *Simultaneous equations, Chemistry, *Integration, Chemical reactions, Digital computers, Mathematical analysis.

This paper discusses the numerical integration of a system of first order ordinary differential equations containing at least one equation subject to numerical indeterminacy. The indeterminate equations are divided into classes which specify how the indeterminacy can be surmounted. For one general class, a new method has been developed which overcomes the indeterminacy by integrating a related sequence of equation systems.

NASA N63-13935 OTS $5.60

Rand Corp., Santa Monica, Calif.
CHANDRASEKHAR'S X AND Y FUNCTIONS FOR HOMOGENOUS ATMOSPHERES, by T. W. Mullikin. Rept. on NASA Contract NAS7-100. Dec 62, 52p. 15 refs. RM-3376-JPL.

AD-277 942 OTS $14.50

RCA Defense Electronic Products, Camden, N. J.
ADVANCED ANALYTICAL AND SIGNAL PROCESSING TECHNIQUES, by Murlan S. Corrington and Roy N. Adams. Rept. on Contract AF 30(602)2484. Apr 62, 216p. 137 refs. RADC-TDR-62-200.

DESCRIPTORS: *Nonlinear systems, *Integral transforms, Phase shifters, Keying, Waveform generators, Signal-to-noise ratio, Matrix algebra, *Applied mathematics, Functions, Complex variables, Special functions, Coding, Modulation, Detection, Signals, Bibliographies.

A complete orthonormal set of periodic rectangular waveforms, called Walsh functions, has been developed for solving problems in nonlinear signal processing. The properties of the functions are given in detail, with many tables to facilitate the solution of problems. They are useful in the solution of nonlinear differential and integral equations, the analysis of binary and multilevel phase-shift-keying systems, the design of perfect codes and the representation of discontinuous phenomena. The resulting series is stable under nonlinear transformations, and the coefficients can be obtained by simple numerical procedures. Applications of Hilbert transforms to the "signature" problem, to observation of a signal in noise, to determination of the amplitude and phase of harmonics, to single-sideband modulation, and many other physical processes are given.

AD-277 949 OTS $2.60

Thompson Ramo Wooldridge, Inc., Canoga Park, Calif.
LINGUISTICS, DATA PROCESSING, AND MATHEMATICS, by Paul L. Garvin and W. Karush (System Development Corp.). Technical note no. 4 on Inductive Methods in Semantic Analysis, Contract AF 49(638)1128 9 July 62, 25p. 16 refs. Document no. SP-771; AFOSR-2866.

DESCRIPTORS: *Language, *Mathematics, Data processing systems,

The two disciplines most closely concerned with language data processing are linguistics and mathematics (including mathematical logic). It is the purpose of this paper to explore how these two disciplines relate to each other and to language data processing. (Mathematics, 20 Aug 63)

Computing Devices

PB 163 238 OTS $12.00

International Business Machines Corp., Kingston, N.Y.
LOW-TEMPERATURE DEVICE DEVELOPMENT PROGRAM ECPX 0023A. Final rept. on Contract AF 30(635)1404. 1 May 59, 167p. 28 refs. AD-215 151.

DESCRIPTORS: *Low temperature research, *Computer storage devices, *Cryogenic storage devices, Design, Test methods, *Thin films, Bismuth, Indium, Antimony, *Vapor plating, Vacuum systems, *Silicon compounds, Monoxides, Thermal diffusion, *Superconductors, Memory devices, Circuits, Trigger circuits, Amplifiers, Oscillators.

Contents:
Fundamental Studies
Vacuum Evaporation Techniques
Device Development
Design and Construction of Environmental and Other Mechanical Assemblies

PB 163 172 OTS $7.60

Remington Rand Univac Div., Sperry Rand Corp., St. Paul, Minn.
PROJECT LIGHTNING. Quarterly rept. no. 1, 1 Dec 58-28 Feb 59, on phase 2, Contract NObsr 77521. [1959] 76p. 3 refs. Rept. no. PX 1304-1; AD-229 792

DESCRIPTORS: *Data processing systems, Digital computers, Design; *Cryogenics, Magnetic materials, Ferromagnetic materials, Films, Thin films, Microwaves.

Project Lightning was established to perform research that indicates the feasibility of, and serves as the basis for the evolution of an ultrahigh-speed data-processing system. Effort was confined to the investigation of deposited magnetic film devices, and to the study of mathematical and logical techniques for exploiting the special properties of these elements. An important development which is expected to result from these ef-

forts is the design and experimental development of a practical very rapid-access memory (with a cycle time of 0.1 μsec or less). Experimentation was carried out to demonstrate the feasibility of using ferromagnetic film cores in devices for performing logical functions. The problem to be solved is that of controlling the uniformity of the required properties, especially when arrays of film elements are deposited on a single substrate. Further studies of the design of magnetic-film logical devices will include the design of arrays to perform specialized logical functions. (Author)

PB 163 176 OTS $5.60

Remington Rand Univac Div., Sperry Rand Corp., St. Paul, Minn.
PROJECT LIGHTNING. Quarterly progress rept. no. 1 vol. 2, 1 June-31 Aug 60, on Phase 3, Contract NObsr-77521. [1960] 53p. 14 refs. Rept. no. PX 1509-1; AD-252 907.

DESCRIPTORS: *Data processing systems, Films, Digital computers, *Cryogenics, Thin films, Magnetic materials, Mathematical logic, Microwaves, Algebras, Design.

Contents:
Film-core program
  Film-deposition techniques
  Apparatus and instrumentation
  Measurements
  Film-switching instrumentation
  Ferromagnetic resonance studies
  Applications
Mathematics and logic research
  Generalization by proof reappraisal
  Majority-logic analogs of Boolean generalized fundamental theorem
  Polyadic generalization of axiom set

PB 163 173 OTS $8.10

Remington Rand Univac Div., Sperry Rand Corp., St. Paul, Minn.
PROJECT LIGHTNING. Quarterly rept. no. 4, 1 Sep-31 Nov 59, on Phase 2, Contract NObsr-77521. [1959] 88p. 14 refs. Rept. no. PX 1304-4; AD-241 249.

DESCRIPTORS: *Data processing systems, Digital computers, Design, *Cryogenics, Magnetic materials, Films, Thin films, Microwaves.

Contents:
Cryogenic test program
  Current distribution and switching mechanism
  Other experiments
Film-core program
  Film-deposition techniques
  Apparatus and instrumentation
  Measurements
  Switching and resonance studies
  Applications
    Parametron studies
    Reversal time of paired film cores
    Search Memory
    Design of an ultracompact high-speed memory
Mathematics and logic research
  Augmented Boolean majority-decision logic
  Axiomatic majority-decision logic
  Design of three-bit decoder
  Proofs

PB 163 174 OTS $9.10

Remington Rand Univac Div., Sperry Rand Corp. St. Paul, Minn.
PROJECT LIGHTNING. Quarterly rept. no. 5, 1 Dec 59-29 Feb 60, on Phase 2, Contract NObsr-77521. [1960] 103p. 35 refs. Rept. no. PX 1304-5; AD-247 321.

DESCRIPTORS: *Data processing systems, Digital computers, Design, *Cryogenics, Magnetic materials, Films, Thin films, Microwaves.

Contents:
Cryogenic Test Program
  Film Deposition and Testing Program
  Film Thickness, Density, and Resistivity Determinations
  Silsbee's Hypothesis
  Other Equipment
Film Core Program
  Film-Deposition Techniques
  Apparatus and Instrumentation
  Switching and Resonance Studies
  Applications
Mathematics and Logic Research
  Triadic Majority-Decision Logic
  Polyadic Majority-Decison Logic
(See also PB 163 173)

PB 163 175 OTS $9.60

Remington Rand Univac Div., Sperry Rand Corp. St. Paul, Minn.
PROJECT LIGHTNING. Quarterly rept. no. 6, 1 Mar-31 May 60, on Phase 2, Contract NObsr-77521. [1960] 115p. 29 refs. Rept. no. PX 1304-6; AD-249 506.

DESCRIPTORS: *Data processing systems, Digital computers, Design, *Cryogenics, Magnetic materials, Films, Microwaves.

Contents:
Cryogenic test program
  Microwave switching test
  Ultrahigh-vacuum chamber
  Apparatus for testing Silsbee's hypothesis
Film-core program
  Film-deposition techniques
  Apparatus and instrumentation
  Switching and resonance studies
  Applications
Mathematics and logic research
Test-machine engineering
  Circuits
  Packaging
(See also PB 163 175)

AD-275 948 OTS $11.00

Remington Rand Univac Div., Sperry Rand Corp., St. Paul, Minn.
RAPID ACCESS PARALLEL TAPE (RAPTAP) STORAGE. Technical rept. on Contract AF 30(602)2468. May 62, 147p. Rept. no. PX 2312; RADC-TDR-62-109.

DESCRIPTORS: *Data storage systems, *Magnetic tape, Data processing systems.

The objective of the Rapid Access Parallel Tape (RAPTAP) Storage Project was to achieve simultaneous multitape movement (without reading/writing) under control of a single Tape Control Unit. This objective was realized by: (1) modifying two Uniservos (IIA, Model 72), (2) using a specially prepared Mylar tape, and (3) making minor modifications to a Tape Control Unit (TCU). After modification, the Uniservos may function in a Normal mode or a RAPTAP mode. In the Normal mode the Uniservos function exactly as standard IIA, Model 72 Uniservos. For the RAPTAP mode a specially prepared Mylar tape was used. This tape utilized reflective markers placed at specified distances along the tape so that the tape can be moved in either direction from marker to marker with a rewind type operation without utilizing the read/write circuits. (Author)

AD-282 497 OTS $9.60

Stanford Research Inst., Menlo Park, Calif.
NEURISTOR LOGIC, by H. D. Crane, R. C. Minnick, and R. A. Short. Interim rept. no. 5 (Final) on Contract AF 33(616)7865. Apr 62, 111p. 20 refs. SRI Proj. no. 3594; ASD-TDR-62-552.

DESCRIPTORS: *Neuromuscular transmission, *Switching circuits, Electrical networks, Electronic circuits, Mathematical logic, Nonlinear systems, Memory devices, Nerves, Transmission lines, Trigger circuits, Triggered gates.

This report summarizes techniques that have been developed for the analysis and synthesis of neuristor networks. The basic aim is the development of systematic procedures for the logical design of such networks. This study parallels concurrent activity in the physical realization of neuristors, and it is expected that each activity will benefit from the presence and influence of the other. This is the fifth report in a series dealing with neuristor structures and networks, and the first dealing solely with the logical design problem. The intention has been to make it self-contained, and where necessary pertinent results from the other studies have been summarized to achieve this aim. (Author)

PB 163 163 OTS $15.50

Thompson Ramo Wooldridge, Inc., Canoga Park, Calif.
THE RESEARCH AND DEVELOPMENT OF A HIGH-SPEED HIGH-DENSITY MAGNETIC DRUM FOR THE AN/ASN-29 AIRBORNE DIGITAL COMPUTER, by T. J. Cummins. Rept. on Digital Computation Methods and Techniques, Contract AF 33(616)5819. Sep 60, 238p. 9 refs. WADD Technical rept. 60-677; AD-249 781.

DESCRIPTORS: *Memory devices, *Magnetic recording systems, *Digital computers, Airborne, Design, Miniature electronic equipment, Circuits, Data processing systems, *Data storage systems.

Research was conducted to develop a high-density, high-speed, miniature, magnetic drum memory in order to decrease the access time of magnetic drums and to allow them to complete more readily with core memories. The magnetic drum was specifically designed for extreme environmental conditions and for possible micro-programming applications. At the present state of development, this design of a magnetic drum looks promising. With the modification or redesign of the head clamps, the design will probably be quite satisfactory. The headconfiguration developed is believed to be an improvement over all previous forms. Environmental tests of the unit in a hermetically sealed case are recommended. Further development of the compound-type floating shoes will be required to mechanize circulating registers of intermediate length. A method of making and lapping compound shoes was developed and tested, but seemed unable to meet certain requirements. Further refinement of techniques appears necessary. The studies developed a circuitry for the memory system, a clock pulse recorder, and a BH tester, all of which are considered quite satisfactory. (Author)

MECHANICS

NASA N63-13604 OTS $3.60

Electronic Systems Lab., Mass. Inst. of Tech., Cambridge.
CAPACITIVE TRANSDUCERS FOR NARROW-BAND VIBRATORY DISPLACEMENTS, by John G. Whitman, Jr. Rept. on NASA Grant NsG-149-61. Oct 62, 40p. 17 refs. ESL-R-153.

NASA N63-13603 OTS $2.60

Electronic System Lab., Mass. Inst. of Tech., Cambridge.
A VIBRATORY ACOUSTIC GYROSCOPE, by Richard Swerdlow and John G. Whitman, Jr. Rept. on NASA Grant NsG-149-61. Dec 63, 29p. 8 refs. ESL-TM-162; DSR-8836.

NASA N63-13445 OTS $2.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
AN EXPERIMENTAL METHOD TO MEASURE THE STRAIN ENERGY FUNCTION W, by A. San Miguel. Rept. on NASA Contract NAS7-100. 20 Dec 62, 26p. 14 refs. JPL-TR-32-365.

NASA N63-16442 OTS $4.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
VIBRATION OF THIN CIRCULAR RINGS. PART II. MODAL FUNCTIONS AND EIGENVALUES OF CONSTRAINED SEMICIRCULAR RINGS, by T. E. Lang. Rept. on NASA Contract NAS7-100. 1 Mar 63, 50p. Technical rept. no. 32-261.

PB 181 505 OTS $2.25

Illinois U., Urbana.
LOW-CYCLE FATIGUE BEHAVIOR OF AXIALLY LOADED SPECIMENS OF MILD STEEL, by J. T. P. Yao and W. H. Munse. Progress rept. no. 3 on Contracts NObs-77139 and NObs-84321. 24 June 63, 81p. 27 refs. Ship Structure Committee Serial no. SSC-151.

DESCRIPTORS: *Ship plates, *Steel, *Fatigue (Mechanics), Loading (Mechanics), Low frequency, Plasticity, *Deformation, *Creep, Theory, Test methods

Studies have been conducted to evaluate the low-cycle high-stress fatigue behavior of several ship steels under a variety of loading conditions. On the basis of these tests and related studies reported in the literature a general hypothesis describing the cumulative effect of plastic deformations has been developed. With this hypothesis the deformation obtained in a single loading may be used to describe or predict the basic low-cycle fatigue behavior of mild steels for lives up to approximately 1,000 cycles. Furthermore, limited correlations with existing data from other investigations suggest that it may also be possible to extend the hypothesis to metals other than steel.

AD-288 546 OTS $3.60

Institute of Engineering Research, U. of California, Berkeley.
THE DESIGN OF PLANE AND AXISYMMETRIC NOZZLES BY THE METHOD OF INTEGRAL RELATIONS, by Maurice Holt. Rept. on Grant AFOSR 62-277. Sep 62, 35p. 12 refs. Series no. 197, Issue no. 1; AFOSR 3140.

DESCRIPTORS: *Nozzles, *Axially symmetric flow, *Transonic flow, *Supersonic flow, *Fluid mechanics, Transformations (Mathematics), Vector analysis.

The method of integral relations due to Dorodnitsyn is applied to the problem of design of plane and axisymmetric nozzles. The inverse problem of calculating the flow field in a nozzle of given shape is also considered. The method is applied here to plane nozzles so that results may be compared with earlier calculations by Cherry using the hodograph method. The extension of the analysis to cover axially symmetric flow is explained. (Author)

PB 163 161 OTS $8.60

Instrumentation Lab., Mass. Inst. of Tech., Cambridge.
LABORATORY TESTING OF A FLOATED SINGLE-DEGREE-OF-FREEDOM, INTEGRATING, INERTIAL GYRO, PARTS I AND II, by William G. Denhard. Rept. on Contract AF 33(616)2039. Sep 56, declassified 30 Mar 60, 96p. 11 refs. Rept. R-105; AD-113 494.

DESCRIPTORS: Inertial navigation, Instrumentation, *Gyroscopes, Floats, Integrators, Test methods.

The testing of a floated, single-degree-of-freedom, integrating, inertial gyroscope requires the use of special test equipment, techniques, and procedures, etc. This testing, and the form of typical test results are described at length in this report. Part I discusses the broad background of the gyro and gyro testing. Part II discusses in a much more definitive manner the testing techniques used to evaluate a single-degree-of-freedom inertial gyro within the laboratory. (Author)

PB 163 261 OTS $14.00

Instrumentation Lab., Mass. Inst. of Tech., Cambridge.
LABORATORY TESTING OF A FLOATED, SINGLE-DEGREE-OF-FREEDOM, INTEGRATING, INERTIAL GYRO. PART III: APPENDICES, by William G. Denhard. Rept. on Contract AF 33(616)2039. Sep 56, declassified 15 June 60, 202p. 37 refs. Rept. R-105; AD-113 493.

DESCRIPTORS: Inertial navigation, Instrumentation, *Gyroscopes, Floats, Integrators, Test methods.

The appendices deal with detailed unbalance formulae, servo-loop analyses, the dynamics of the gyro, gimbal compliance, and test data forms. (Author)
(See also PB 163 161)

PB 181 504 OTS $0.75

Lessells and Associates, Inc., Boston, Mass.
AN UNMANNED SYSTEM FOR RECORDING STRESSES AND ACCELERATIONS ON SHIPS AT SEA, by D. J. Fritch and F. C. Bailey. Progress rept. no. 1 on Contracts NObs-77139 and NObs-84321. 3 June 63, 28p. 10 refs. Ship Structure Committee Serial no. SSC-150.

DESCRIPTORS: *Ships (Nonmilitary), *Cargo ships, Ocean waves, *Acceleration, *Stresses, Measurement, *Strain gages, *Transducers, *Magnetic recording systems, Automatic, *Accelerometers, Design, Operation

In order to obtain long-term statistical data on wave-induced bending moments, two dry-cargo ships have been equipped with stress transducers and automatic magnetic-tape recording instrumentation. One of these ships has also been equipped with accelerometers to provide information on seaway-induced loads on cargo. The transducers and their installation are described, as well as the data conditioning units, the tape recorder, and the programmer which allows sampling of the data at pre-selected intervals and continuous recording when pre-set stress levels are exceeded. The system has performed beyond expectation; data have been obtained on 36 round-trip voyages representing almost three ship-years of operation. Versatility of the unit in handling a variety of data inputs and adapting to various data reduction methods has been demonstrated. In addition, the data tapes are available for future analysis in a broad spectrum of naval design applications. Experience gained to date will permit future installations to be handled expeditiously and at minimum expense, with a high degree of reliability of the unit assured in service.

PB 163 169 OTS $8.60

Pennsylvania State U. [University Park].
HYDRODYNAMIC STABILITY, by M. Lessen, H. G. Lew and others. Technical rept. no. 2 on Contract Nonr-65601. May 54, 98p. 55 refs. AD-36 886.

DESCRIPTORS: *Hydrodynamics, *Fluid flow, *Stability, Axially symmetric flow, Laminar boundary layer, Compressible flow, Viscosity, Reynolds number, Equations of motion, Numerical analysis.

The problem investigated is that of the hydrodynamic stability of quasi-parallel flows with infinite boundaries. A sufficient condition for the stability of 2-dimensional parallel flows is derived that demonstrates the existence of a minimum nonzero Reynolds number for instability of flows with infinite boundaries. The characteristics of the Orr-Sommerfeld equation are explored for the case of the full jet. First approximations were obtained to the inviscid and viscous eigenvalues by the use of Galerkin's method. An investigation of the stability of an axially symmetric laminar jet subjected to rotationally symmetric disturbances showed that the jet is stable to tangential disturbances if it is rotationally symmetric. Further investigation showed that there are no self-excited or damped disturbances if viscosity is neglected. The neutral disturbance is calculated by Galerkin's method. The stability of the vortex sheet or ideal jet in an inviscid compressible fluid with respect to 2-dimensional small disturbances is considered. The eigenvalues of the determinantal equation show complete stability for high mach-number flows. The Mach number for complete stability is the same order of magnitude as that given by Lin in NACA TN 2887 and Pai (J. Aeronaut. Sci. 18, no. 11:731-742, 1951). The nonparallel aspects of the previously considered problems are discussed. (DDC abstract)

PB 163 170 OTS $4.60

Polytechnic Inst. of Brooklyn, N. Y.
POSTBUCKLING BEHAVIOR OF CIRCULAR CYLINDRICAL SHELLS UNDER HYDROSTATIC PRESSURE, by Joseph Kempner, K. A. V. Pandalai, and Sharad A. Patel. Rept. on Contract N6onr-26303. May 54, 44p. 15 refs. PIBAL rept. no. 256; AD-36 769.

DESCRIPTORS: *Cylindrical bodies, *Deformation, *Hydrostatic pressure, Mechanical properties, Stresses, Deflection, Theory, Numerical analysis, Structural shells.

The postbuckling behavior of initially perfect, thin-walled, circular cylindrical shells under hydrostatic pressure is investigated with the aid of the principle of stationary potential energy together with appropriate approximate deflection functions. The results of the calculations show that postbuckling equilibrium configurations are possible only for loads in excess of the critical loads calculated from small-deflection theory. Furthermore, for loads corresponding to radial displacements of the order of the shell thickness, the number of circumferential waves remains essentially constant with increasing load and equal to the number of waves obtained at buckling. (Author)

NASA N63-15509 OTS $1.75

Space Technology Labs., Inc., Redondo Beach, Calif.
AN INVESTIGATION OF RESONANT, NONLINEAR, NONPLANAR FREE SURFACE OSCILLATIONS OF A FLUID, by R. E. Hutton. Rept. on NASA Contract NASr-80. May 63, 67p. 5 refs. Technical note D-1870.

NASA N62-16692 OTS $13.00

Aeroelastic and Structures Research Lab., Mass. Inst. of Tech., Cambridge.
FLOW IN THE MIXING REGION OF A JET, by Marc A. Kolpin. Rept. on NASA Grant NsG-31-60. June 62, 183p. 64 refs. ASRL-TR-92-3.

NASA N62-71929 OTS $1.50

Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
INVESTIGATION AT MACH NUMBERS OF 0.20 TO 3.50 OF A BLENDED DIAMOND WING AND BODY COMBINATION OF SONIC DESIGN BUT WITH LOW WAVE-DRAG INCREASE WITH INCREASING MACH NUMBER, by George H. Holdaway, Jack A. Mellenthin, and Elaine W. Hatfield. Oct 59, declassified 1 Sep 61. 54p. 26 refs. Technical memo. X-105.

NASA N62-71867 OTS $0.75

Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
AN INVESTIGATION OF THE PITCHING-MOMENT CONTRIBUTION OF A HIGH HORIZONTAL TAIL ON AN UNSWEPT-WING AND BODY COMBINATION AT MACH NUMBERS FROM 0.80 TO 1.40, by Garth W. Lippmann. Aug 59, declassified 11 July 61. 30p. 10 refs. Technical memo. X-43.

NASA N63-13892 OTS $1.25

Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
TRANSONIC STATIC AERODYNAMIC CHARACTERISTICS OF A BLUNT CONE-CYLINDER BODY WITH FLARED AFTERBODIES OF VARIOUS ANGLES AND BASE AREAS, by Roy M. Wakefield, Earl D. Knechtel, and others. Dec 59, declassified 8 Feb 63, 45p. 8 refs. Technical memo. X-106.

NASA N63-13884 OTS $1.25

Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
WIND-TUNNEL INVESTIGATION OF DEVICES TO IMPROVE STATIC DIRECTIONAL STABILITY OF AN UNSWEPT-WING AIRPLANE MODEL AT MACH NUMBERS FROM 0.8 TO 2.2, by Ralph W. Holtzclaw. Dec 58, 45p. 7 refs. NASA MEMO 10-4-58A.

PB 163 209 OTS $3.60

Brown U., Providence, R. I.
SUPERSONIC ROTATIONAL FLOW AROUND A SHARP CORNER OF A BODY OF REVOLUTION, by Hung-Ta Ho and Maurice Holt. Rept. on Theoretical Research on Hypersonic Flows, Contract AF 33(616)2798. Sep 56, 31p. 2 refs. WADC TN 56-394; AD-97 272.

DESCRIPTORS: *Hypersonic flow, *Supersonic flow, Vortices, *Bodies of revolution, Cylindrical bodies, Aerodynamic configurations, Equations of motion, Series, Aerodynamics.

The sonic shoulder, a singularity which arises in the uniform hypersonic flow past a cone cylinder with a detached bow wave, is investigated by extending the analysis of Johannesen and Meyer (Aeronaut. Quart. 2:127-142, 1950) to include a generalization to nonisentropic flow and an analysis near the sonic line. A cone cylinder of semiangle α is considered which reduces to a flat headed cylinder when $\alpha = \pi/2$. Series expansions are made in powers of the distance from the shoulder, with coefficients which depend on the angular coordinate based on the shoulder. The zero order terms correspond to a Prandtl-Meyer expansion. The first order terms determine the curvatures of the sonic line and the final characteristic of the centered expansion for connecting the singularity with the rest of the mixed-flow field. Only constant entropy to the first order is compatible with finite initial sonic-line curvature and the actual flow conditions behind detached shocks in a uniform stream. The first order terms are determined completely by local conditions at the shoulder. (DDC abstract)

NASA N62-16436 OTS $4.60

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
ENTROPY CHANGES IN NONEQUILIBRIUM FLOWS, by Alan Q. Eschenroeder. Rept. on NASA Contracts NAS5-670 and NASr-109. Sep 62, 42p. 17 refs. CAL-AD-1689-A-2.

AD-277 142 OTS $8.60

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
INVISCID HYPERSONIC AIRFLOWS WITH COUPLED NONEQUILIBRIUM PROCESSES, by J. Gordon Hall, Alan Q. Eschenroeder, and Paul V. Marrone. Rept. on Project Defender, Contract AF 49(638)792. May 62, 94p 37 refs. CAL rept. no. AF-1413-A-2; AFPSR-2072, NASA N62-13548.

DESCRIPTORS: *Hypersonic flow, Analysis, *Thermochemistry, Aerodynamics, Chemical reactions, Gas ionization, Blunt bodies, Hypersonic nozzles, Chemical equilibrium, Reaction kinetics, Dissociation, Recombination reactions, Exchange reactions, Ionization.

Analyses have been made of the effects of coupled chemical rate processes in external and internal inviscide hypersonic airflows at high enthalpy levels. Exact (numerical) solutions have been obtained by the inverse method for inviscide airflow over a blunt nose under flight conditions where chemical nonequilibrium prevails through the nose region. Numerical solutions have also been obtained for nonequilibrium expansions of air from initial equilibrium states appropriate to afterbody flows in flight and to hypersonic nozzle airflows. The results illustrate the general importance of the coupling among the reactions considered. These included dissociation-recombination, bimolecular exchange, and ionization reactions. In blunt-nose flow the NO exchange reactions are important for the kinetics of NO and N. In the regime studied, where nonequilibrium prevails through the nose region, atom concentrations tend to freeze at levels below infinite-rate equilibrium. The kinetics are dominated by two-body collision processes. As a consequence, the entire inviscid airflow including coupled nonequilibrium phenomena can be scaled at given velocity on the basis of a constant product of ambient density and body scale. This similitude, which includes vibrational nonequilibrium, can also be employed for simultaneous scaling of viscous and radiation phenomena in the shock layer. It provides a useful flexibility for hypersonic testing where applicable.

PB 163 228 OTS $2.60

David Taylor Model Basin, Washington, D. C.
THE DESIGN AND PERFORMANCE OF AN AIR-DRYING SYSTEM FOR A SUPERSONIC WIND TUNNEL, by R. T. Patterson. Dec 51, 24p. 1 ref. Aero rept. 811.

DESCRIPTORS: *Supersonic wind tunnels, Wind tunnels, Air, Dehydration, *Driers (Apparatus), Silicon compounds, Dioxides, Gels, *Desiccants, Design, Tests.

This report describes the design data used and the subsequent observed performance characteristics of an air-drying system designed to provide an average of 1,100,000 cubic feet of air per day dried to a dew point of -15°F or lower for an intermittent supersonic wind tunnel. The data presented show that the performance of such an air-drying system can be predicted with sufficient accuracy. (Author)

NASA N63-13894 OTS $0.75

Flight Research Center, National Aeronautics and Space Administration, Edwards, Calif.
APPROACH AND LANDING INVESTIGATION AT LIFT-DRAG RATIOS OF 3 TO 4 UTILIZING A DELTA-WING INTERCEPTOR AIRPLANE, by Gene J. Matranga and Joseph A. Menard. Oct 59, declassified 8 Feb 63, 24p. 3 refs. Technical memo. X-125.

NASA N63-13885 OTS $1.00

Flight [Research Center] National Aeronautics and Space Administration, Edwards, Calif.
LIFT AND DRAG OF A SWEPT-WING FIGHTER AIRPLANE AT TRANSONIC AND SUPERSONIC SPEEDS, by Jack Nugent. Jan 59, 32p. 5 refs. MEMO 10-1-58H.

NASA N63-14071 OTS $1.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
THE LAMINAR BOUNDARY LAYER NEAR THE LEADING EDGE OF A FLAT PLATE, by O. T. Hanna. 1961, 15p. 8 refs.

NASA N63-13447 OTS $5.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
RESONANCE TUBES IN A SUPERSONIC FLOW FIELD, by T. Vrebalovich. Rept. on NASA Contract NAS7-100. 30 July 62, 58p, 16 refs. JPL-TR-32-378.

NASA N63-12502 OTS $0.75

Langley Research Center, National Aeronautics and Space Administration, Langley Field, Va.
AERODYNAMIC CHARACTERISTICS OF THE X-15/B-52 COMBINATION, by William J. Alford, Jr. and Robert T. Taylor. June 59, declassified 1 Dec 62, 29p. 5 refs. NASA MEMO 6-8-59L.

NASA N63-15527 OTS $2.00

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
EFFECTS OF NOSE BLUNTNESS, FINENESS RATIO, CONE ANGLE, AND MODEL BASE ON THE STATIC AERODYNAMIC CHARACTERISTICS OF BLUNT BODIES AT MACH NUMBERS OF 1.57, 1.80, AND 2.16 AND ANGLES OF ATTACK UP TO 180°, by David S. Shaw, Dennis E. Fuller, and others. May 63, 78p. 12 refs. Technical note D-1781.

NASA N63-13898 repriced OTS $1.25

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
EXPERIMENTAL INVESTIGATION OF A TRANSONIC COMPRESSOR CASCADE AND TEST RESULTS FOR FOUR BLADE SECTIONS, by James C. Emery, James C. Dunavant, and Willard R. Westphal. Jan 60, declassified 8 Feb 63. 44p. 5 refs. Technical memo. X-197.

NASA N63-12498 repriced OTS $1.50

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
HEAT-TRANSFER MEASUREMENTS OF TWO WING-BODY COMBINATIONS AT 8° ANGLE OF ATTACK FROM A FLIGHT TEST FOR MACH NUMBERS TO 4.86 AND REYNOLDS NUMBERS TO 19.2×10^{6}, by Katherine C. Speegle. Dec 58, declassified 25 Oct 62. 61p. 18 refs. NASA MEMO 10-25-58L.

NASA N63-13911 repriced OTS $1.00

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
INVESTIGATION OF THE NORMAL-FORCE, AXIAL-FORCE, AND PITCHING-MOMENT CHARACTERISTICS OF BLUNT LOW-FINENESS-RATIO BODIES OF REVOLUTION AT A MACH NUMBER OF 3.55, by Russell W. McDearmon and Warren A. Lawson, Apr 61, declassified 8 Feb 63. 32p. 13 refs. Technical memo. X-467.

NASA N63-12555 OTS $1.50

Langley Research Center, National Aeronautics and Space Administration, Langley Field, Va.
THE LOW-SPEED STATIC LONGITUDINAL AND LATERAL CHARACTERISTICS OF A DELTA-WING MODEL WITH FIXED AND FREE-FLOATING CANARD SURFACES, by William I. Scallion and Michael D. Cannon. Oct 59, declassified 1 Dec 62, 59p. 10 refs. Technical memo X-120.

NASA N63-12497 OTS repriced $2.50

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
TABULATED DATA FROM A PRESSURE-DISTRIBUTION INVESTIGATION AT MACH NUMBER 2.01 OF A 45° SWEPTBACK-WING AIRPLANE MODEL AT COMBINED ANGLES OF ATTACK AND SIDESLIP, by John P. Gapcynski and Emma Jean Landrum. Nov 58, declassified 25 Oct 62, 104p. 1 ref. MEMO. 10-15-58L.

NASA N63-13897 repriced OTS $1.50

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
USE OF EXPERIMENTAL STEADY-FLOW AERODYNAMIC PARAMETERS IN THE CALCULATION OF FLUTTER CHARACTERISTICS FOR FINITE-SPAN SWEPT ON UNSWEPT WINGS AT SUBSONIC, TRANSONIC, AND SUPERSONIC SPEEDS, by E. Carson Yates, Jr. Jan 60, declassified 1 Apr 63. 52p. 15 refs. Technical memo. X-183.

AD-293 611 OTS $3.60

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
GAS DYNAMICS OF CHEMICALLY-REACTING GAS MIXTURES NEAR EQUILIBRIUM, by M. Lenard. Rept. on Contracts AF 04(694)18 and AF 04(694)222. Dec 62, 37p. 15 refs. Technical Information Series R62SD985; NASA N63-11500.

DESCRIPTORS: *Gas flow, Gases, Mixtures, *Fluid dynamics, Chemical reactions, *Chemical equilibrium, Thermodynamics, Equations of state, Oxygen, Nitrogen, Free radicals, Boundry layer, *Flat plate models, *Nozzles, *Re-entry aerodynamics, Theory.

The general problem of flow of a chemically-reacting gaseous mixture near chemical equilibrium is treated in terms of an expansion procedure. In order to satisfy boundary conditions behind thermally equilibrated but chemically inactive shocks, the expansion procedure must be performed in terms of simultaneous "outer" and "inner" expansions. The outer solution is the chemical equilibrium solution and successive corrections thereto. The inner flow describes the structure of the thin relaxation layer. From considering the second term in the outer expansion, which describes linearized corrections to the equilibrium flow field due to finite reaction rates, it can be shown that for some practically important flows the second order composition corrections are proportional to certain combinations of derivatives of thermodynamic properties of the equilibrium flow field. The proportionality coefficients depend only on thermo-chemical properties of the reacting mixture. Calculations of such incipient non-equilibrium coefficients are given for a seven component (O_2, O, N_2, N, NO, NO+, e^-) ten reaction models of high temperature air, for both inviscid and boundary layer-like flows. (Author)

PB 181 520 OTS $2.75

United Aircraft Corp. [East Hartford, Conn.]
FLUID AMPLIFICATION 6. AERODYNAMIC STUDIES OF PURE-PNEUMATIC SYSTEMS, by Robert E. Olson. Interim rept. 24 June 60-23 June 62, on Contract DA 49-186-ORD-912. 12 Oct 62, 133p. 10 refs. A1771-16; NASA N63-13060.

DESCRIPTORS: *Pneumatic systems, Fluid dynamic properties, Fluid flow, Jets, *Compressible flow, *Aerodynamic characteristics

Theoretical and experimental investigations were conducted to provide information regarding the aerodynamic characteristics of two-dimensional compressible jets. The investigations included studies of both free jets and attached jets (i.e., jets, initially unattached,

which subsequently attach on one side to a boundary wall). Good correlation between theory and experiment was found for the free jets using constant exchange coefficient mixing theory with Prandtl's concept for the turbulent exchange coefficient and a Gaussian velocity distribution in the mixing zone.

METALLURGY

PB 163 202 OTS $2.60

Aeronautical Materials Lab., Naval Air Material Center, Philadelphia.
THE INVESTIGATION OF SPOT-WELDING ON PLATED LOW CARBON STEELS, by C. M. Dougherty. 9 Oct 50, 29p. 4 refs. Rept. no. AML NAM 25789, Part II; AD-95 895.

DESCRIPTORS: *Steel, Welding, *Spot welding, *Corrosion inhibition, Metal coatings, *Zinc coatings, *Cadmium plating, *Tin coatings, *Nickel coatings, *Aluminum coatings.

PB 163 227 OTS $1.10

Defense Metals Information Center, Columbus, Ohio.
EXPERIMENTAL COATING OF GRAPHITE NOZZLE INSERTS WITH TUNGSTEN BY HYDROGEN REDUCTION OF TUNGSTEN HEXAFLUORIDE, by E. A. Beidler and J. M. Blocher, Jr., Final rept. [on Contract NOrd-18794]. 16 Jan 61, 9p. 7 refs.

DESCRIPTORS: *Nozzles, *Refractory coatings, *Graphite, *Tungsten, *Vapor plating, Tungsten compounds, *Fluorides, Reduction (Chemistry), *Hydrogen.

AD-403 493 repriced OTS $3.50

Defense Metals Information Center, Columbus, Ohio.
A GUIDE TO THE LITERATURE ON HIGH-VELOCITY METALWORKING, by D. E. Strohecker and D. H. Owens. 3 Dec 62, 250p. DMIC rept. 179.

DESCRIPTORS: *Material forming, *Metals, *Alloys, *Bibliographies, Explosive forming, Hardening, Material removal, Industrial equipment, Machining, Manufacturing methods, Velocity, High pressure research, Explosive materials, Energy, Powder metallurgy, Firing mechanisms (Ammunition), Mechanical properties.

This report is a guide to the literature on high-velocity metalworking. It consists primarily of abstracts of articles, reports, books, and current research projects on and related to high-velocity metalworking arranged according to technical subject. It covers a survey of the reported work in the field up to about October of 1962. Abstracts of over 700 references have been arranged by subject matter, with cross indexing between subjects. There is also an author index. The eleven major subjects and categories covered in the report are: (1) Energy Sources, (2) Energy Transfer Mediums, (3) Facility Requirements, (4) Tooling Requirements, (5) Equipment Requirements, (6) Forming, (7) Hardening, (8) Explosive Welding, (9) Powder Compaction, (10) Metal Removal, and (11) Material Behavior. (Author)

PB 163 192 OTS $4.60

[Metals Research Lab.] Case Inst. of Tech., Cleveland, Ohio.
LOW TEMPERATURE BRITTLENESS, by A. W. Magnusson (Master's thesis) and W. M. Baldwin, Jr. Technical rept. no. 34 on An Investigation of the Effects of Stress Concentration and Triaxiality on the Plastic Flow of Metals, Contract N6onr-273/1. Mar 56, 50p. 29 refs. AD-88 559

DESCRIPTORS: *Low temperature research, *Brittleness, Determination, *Tungsten, *Cadmium, *Tin, *Molybdenum, *Iron, *Zinc, *Magnesium alloys, Ductility, Stresses, Grain structures (Metallurgy).

The ductility of seven pure metals and one alloy at various temperatures and strain rates, as well as ductility data taken from the literature, showed that W, Cd, Sn, Mo, Fe and Cr had a similar type of low temperature brittleness. When the reciprocal of the absolute temperature for full brittleness (1/T) was plotted vs. log strain rate, straight lines were obtained. These curves extrapolated toward a roughly common value ($\dot{\epsilon} \approx 10^{11}$ in/in/min) at $1/T = 0$. Zinc was brittle at low temperatures and high strain rates, but the brittle boundary curve extrapolated to a higher value ($\dot{\epsilon} \approx 10^{33}$ in/in/min) at $1/T = 0$. The low temperature behavior of magnesium appeared to be masked by other effects. The generalization that all metals not crystallizing in the face-centered cubic system are brittle at low temperatures was not confirmed in this study, e.g., V, Ta, Zr and Ti were ductile down to liquid air temperatures and at strain rates equal to 19,000 in/in/min. On the other hand, the decreased ductility in the face-centered cubic alloys, e.g., Cu-0.5%Sb, appeared to be another type of brittleness than that observed in W, Cd, etc. (Author)

NASA N62-17577 OTS $1.60

National Bureau of Standards, Washington, D. C.
A SIMPLE ENVIRONMENTAL CHAMBER FOR R. R. MOORE FATIGUE TESTING MACHINES, by J. A. Bennett. Rept. on NASA Order R-14. 1962, 12p. 4 refs.

AD-296 434 OTS $6.60

Naval Weapons Lab., Dahlgren, Va.
FRACTURE TOUGHNESS STUDY OF Ti-6Al-6V-2Sn TITANIUM ALLOY SHEET 0.1 INCH THICK FOR POSSIBLE APPLICATION IN THE CONSTRUCTION OF WELDED SOLID-PROPELLANT ROCKET MOTOR CASES, by H. E. Romine. Rept. on Fracture Work Rates of SP Materials. 4 Feb 63, 64p. 9 refs. NWL rept. no. 1839.

DESCRIPTORS: *Titanium alloys, Sheets, *Welds, Mechanical properties, Tensile properties, Microstructure, Hardness, Fatigue (Mechanics), Hardening, Heat treatment, Fracture (Mechanics), *Rocket cases, Aluminum alloys, Vanadium alloys, Tin alloys.
Fracture toughness tests were made on unwelded base metal heat treated to a range of yield strengths and on welded specimens simulating the girth welds in a rocket motor casing. Machined starting notches were compared with fatigue cracks. The optimum strength-toughness relation for hoop stress in the cylinder wall occurred at a satisfactory value for σ_{YS}/ρ of about 1.0×10^6 inches. Fracture toughness was unsatisfactory in the welds because of a hard zone at the weld edge. (Author)

AD-289 364 OTS $7.60

Research Chemicals Div., Nuclear Corp. of America, Phoenix, Ariz.
REFRACTORY INTERMETALLIC COMPOUNDS, by Craig G. Kirkpatrick. Final rept. on Contract NOw 61-0257c. Feb 62, 80p. 10 refs. Rept. no. RC 195; NASA N62-17053.

DESCRIPTORS: *Intermetallic compounds, *Refractory materials, *Heat resistant metals and alloys, *Hafnium alloys, *Boron alloys, *Corrosion inhibition, *Coatings, *Phosphides, Melting, Oxidation, Ductility, *Rare earth elements, Phase studies, Gadolinium alloys, Iron alloys, Nickel alloys, Cobalt alloys, Antimony alloys, Bismuth alloys, Selenium alloys, Dysprosium alloys, Silicon alloys, Rhenium alloys.

An investigation of intermetallic refractory compounds was carried out. Alloy series were designed for screening materials which would show promise of elevated temperature utilization. Parameters used for evaluation included: (1) melting points, (2) oxidation resistance, (3) strength to weight ratios at elevated temperatures, and, (4) ductility indications at normal ambient temperatures. Produced were two systems of interest: the hafnium-boron intermetallic and a phosphide surface coating for decreasing rate of corrosion. X-ray and metallographic methods were used for compound verification. (Author)

Nonferrous (except light) Metals

AD-268 473 OTS $2.60

High Pressure Physics Lab., U. of Oklahoma Research Inst., Norman.
THE MELTING CURVES OF FIVE METALS UNDER HIGH PRESSURE, by Marvin L. McDaniel, Stanley E. Babb, Jr., and Gene J. Scott. Technical rept. no. 2 on Contract Nonr-982(05). Oct 61, 25p. 27 refs.

DESCRIPTORS: *High pressure research, High temperature research, Metals, *Indium, *Tin, *Thallium, *Bismuth, *Lead, Pressure vessels, *Seals (Stoppers), *Electric connectors, Design.

This paper reports the development of a method of measuring the melting curves of metals with a precision on the order of .1°C, and its application to five metals, and includes: Multiple lead high pressure plug, pub. in The Review of Scientific Instruments 32:868-870 July 61
(See also AD-260 791)

AD-268 188 OTS $6.60

Metals Research Labs., Union Carbide Metals Co., Niagara Falls, N. Y.
THE METALLURGY OF SCANDIUM, by Doyle Geiselman. Rept. for 1 June 59-30 Nov 60, on Metallic Materials, Contract AF 33(616)6262. Aug 61, 64p. 13 refs. WADD Technical rept. 60-894.

DESCRIPTORS: Metallurgy, *Scandium, Melting, Processing, Physical properties, Mechanical properties, Electrical properties, Electrochemistry, Corrosion, Scandium alloys, *Titanium alloys, *Chromium alloys, Oxidation.

This study of the metallurgy of scandium was undertaken to determine some of the unknown physical and mechanical properties. Sublimed calcium-reduced metal was used to study these properties which are summarized in the Appendix for convenience. The properties of scandium are more nearly like those of yttrium and the rare earths than those of aluminum. Some mechanical and physical properties of scandium-titanium alloys are given. Limited data on the effect of scandium additions to titanium and chromium are also presented. In all cases, the behavior of scandium was very much like that of yttrium. (Author)

Structural Metallurgy and Corrosion

PB 163 184 OTS $6.60

General Chemical Div., Allied Chemical Corp. [New York].
STUDY OF CORROSION OF METALS IN FLUORINE, by R. B. Jackson. Final rept. on Contract AF 04(611)3389. Mar 60, 70p. 7 refs. AD-235 162.

DESCRIPTORS: *Corrosion research, Corrosive liquids, Corrosive gases, *Fluorine, Laboratory equipment, Metals, Alloys, Microstructure, Thin films, Thickness.

The corrosion of 25 metals and alloys by liquid and gaseous F was studied. The liquid corrosion tests were performed at -320°F and exposure ranged from 5 hours to 3 days. Exposures to gaseous F were made at approximately 80°, 400°, 700° and 1000°F. Exposure times were generally 5, 24 and 120 hours. Several specimens were also exposed to gaseous F at elevated pressures and temperature for 24 hours. Selected specimens were sectioned and photomicrographs taken to study the passivating fluoride film. Results of the five-hour tests indicate that all tested materials, except Ta, may be exposed to F at temperature up to 400°F without exceeding a corrosion rate of one-half thousandth of an inch (.0005") per hour; the rate is equivalent to 4.4 in. per year, which is an extremely high corrosion rate under normal circumstances, but not excessive when exposure for only a few hours is required. Extrapolation of the results obtained from very short exposures to long time service, such as a year, is not reliable. At elevated pressures corrosion rates are generally higher than specimens exposed to the same temperatures at atmospheric pressure. Microscopic examination of selected specimens shows that materials such as monel and Ni form a relatively uniform passivating film at elevated temperatures.

AD-276 919 OTS $6.60

Materials Advisory Board, National Research Council, Washington, D. C.
REPORT OF THE SUBPANEL ON COATINGS, REFRACTORY METALS SHEET ROLLING PANEL. Rept. on Contract SD-118. 1 June 62, 67p. Rept. no. MAB-181-M.

DESCRIPTORS: *Refractory materials, *Coatings, *Heat resistant metals and alloys, Oxidation inhibitors, *Molybdenum, Molybdenum alloys, *Niobium, Niobium alloys, *Tantalum, Tantalum alloys, *Tungsten, Tungsten alloys, Sheets, Metals, Physical properties, Chemical properties, *Metal coatings, *Ceramic coatings.

A questionnaire was developed and submitted to industry in order to determine the current state of the art of refractory alloy coatings. The results of the survey were tabulated and analyzed to determine the current state of the art relative to the needs of the sheet rolling program. Very little work has been done in the development of coatings or application of developed coatings to the alloys of the program. Data on coatings of all kinds are very meager and there is not one coating in existence for which there is available a complete range of design data.

AD-275 716 OTS $9.10

Rensselaer Polytechnic Inst., Troy, N. Y.
THE STRENGTHENING OF COLUMBIUM AND COLUMBIUM ALLOYS BY INTERSTITIAL ALLOYING ELEMENTS, by F. V. Lenel, L. J. Regitz, and W. R. Hulsizer. Rept. on Contract DA 30-069-ORD-3868. 11 May 62, 101p. 53 refs. AROD Rept. no. 2530:1; NASA N62-12777.

DESCRIPTORS: *Niobium, Niobium alloys, Niobium compounds, Oxides, Solubility, Chemical precipitation Nucleation, *Oxygen, Hardening, Phase studies, Decomposition, Heat treatment, Dispersion hardening, Grain structures (Metallurgy), *Crystal structure, Deformation, Crystal lattices, Crystallization, Reaction kinetics, Diffusion, Theses, Hardness, Metallography, X-ray diffraction analysis.

Solid solutions of O in Nb were prepared at 1250 C, cooled rapidly to retain all the O in supersaturated solution, and subjected to isothermal precipitation heat treatments at 650 and 705 C, in a high vacuum. The course of precipitation was followed through measurement of the lattice parameter of the matrix and, in some specimens, microhardness measurements. The morphology of the precipitate was determined metallographically. At 650 C, equiaxed CbO precipitate particles were nucleated at the intersections of grain boundaries with free surfaces. At 705 C, in addition to these sites, particles nucleated at grain boundaries and grain boundary intersections throughout the matrix; growth of the precipitate was continuous, without the formation of metastable intermediate solutions or precipitates. The rate of decomposition was strongly dependent on the supersaturation of the solid solution. (Author)

NUCLEAR PHYSICS AND NUCLEAR CHEMISTRY

NASA N63-13446 OTS $3.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
LEAST-SQUARE ANALYSIS OF GAMMA-RAY PULSE HEIGHT SPECTRA, by J. I. Trombka. Rept. on NASA Contract NAS7-100. 15 Dec 62, 33p. 12 refs. JPL-TR-32-373.

PB 163 217 OTS $2.60

Naval Radiological Defense Lab., San Francisco, Calif.
PERFORMANCE CHARACTERISTICS OF AN AEROSOL CONTAMINATION CHAMBER AND STUDY OF DECONTAMINATION METHODS, by R. K. Fuller, W. B. Lane, and L. L. Wiltshire. 10 Apr 57, 24p. 9 refs. Research and Development technical rept. USNRDL-TR-158; AD-153 931.

DESCRIPTORS: *Aerosol generators, *Radiological contamination, *Decontamination, Performance tests, Sea water, Radioactivation analysis, Chlorides, Gamma rays, Radioactivity.

The contaminating characteristics of a new radioactive seawater aerosol contamination chamber were determined from size distribution of the aerosol fog at two points in the chamber by the water sensitive film technique from chloride analyses that gave the total mass of material deposited as a function of exposure time, and by gamma counting each exposed sample. Relative effectiveness of four decontamination methods was established. It was also shown that the amount of residual radioactivity approached a constant value independent of the initial activity. (Author)

PB 163 211 OTS $3.60

Polytechnic Inst. of Brooklyn, N. Y.
HIGH VALUE INSULATORS, by J. Steigman, R. Brill and others. Quarterly progress rept. no. 6, 1 Oct-31 Dec 52, on Contract DA 36-039-sc-15327. 20 Jan 53, 39p. 18 refs. AD-2347.

DESCRIPTORS: *Electric insulation, *Organic compounds, *Radiation chemistry, *Resistance(Electrical), Electric bridge, X-rays, Gamma rays, Ionization, Polymers, *Styrenes, *Chloroform, Dyes, Absorption spectrum, Chemical properties, Physical properties, *Radiation effects, Detectors, Insulating materials.

A unifilar Wulf electrometer was calibrated and used to determine the resistance of a 10^{14} ohm Victoreen resistor that had previously been measured using the Wheatstone Bridge method. A convenient method for the precipitation of carbon dioxide as barium carbonate has been devised which eliminates the blank previously obtained. Futher kinetic studies were performed using the Dye, p-dimethyl-amino-p'-diazocyanideazobenzene and diphenyl picrylhydrazyl as free radical acceptors and the initiator 1, 1-azo-bis-cyclopentylnitrile as the free radical source. The Dye was found to be somewhat less reactive at 60° than at 80°. The method of Clark (mercuric diphenyl carbazone complex) has been found to be unsatisfactory for the analytical problem of measuring low chloride ion concentration. (See also PB 163 210)

PB 163 212 OTS $3.60

Polytechnic Inst. of Brooklyn, N. Y.
HIGH VALUE INSULATORS, by J. Steigman, R. Brill and others. Quarterly progress rept. no. 7, 1 Jan-31 Mar 53, on Contract DA 36-039-sc-15327. 28 Apr 53, 34p. 12 refs. AD-11 084.

DESCRIPTORS: *Electric insulation, *Organic compounds, *Radiation chemistry, *Resistance (Electrical), *Electric bridge, X-rays, Gamma rays, Ionization, Polymers, *Styrenes, Butanes, Chlorides, *Chloroform, Absorpdion spectrum, Chemical properties, Physical properties, *Radiation effects, Detectors, Insulating materials,

The Wheatstone-bridge detecting circuit was modified to include a split FP-54 electrometer tube to decrease the rate of drift of the zero position. Preliminary measurements indicated the possibility of measuring resistances of the order of 10^{16} ohm within 5%. X-irradiation of polystyrene for 18 hr produced no significant change in the infra red spectrum. A polystyrene film containing diphenylpicrylhydrazyl faded slightly after a few hours of irradiation. When the irradiated film was dissolved in C_6H_6 and heated to 80°C for 1.5 hr, the purple color changed to amber; hydroperoxides may have formed during irradiation and been decomposed by heat. A similar color change occurred when the undissolved film was heated 4 hr at 80°C. Polymerization was inhibited when p-chlorobenzene diazocyanide reacted with styrene at 80°C; the colorless polymer which was produced indicated that the diazocyanide group was destroyed during the reaction. Attempts are being made to synthesize p-vinyl-p-terphenyl for incorporation into polystyrene to increase the polymer stability to radiation. A procedure was developed for analyzing the chloride produced by x-irradiation of BuCl. The production of chloride as a function of time of x-irradiation of BuCl passed through a maximum at approximately 290 min. (See also PB 163 211) (DDC abstract)

PB 163 210 OTS $6.60

Polytechnic Inst. of Brooklyn, N. Y.
HIGH VALUE INSULATORS, by J. Steigman, R. Brill and others. Quarterly rept. no. 3, 1 Jan-31 Mar 52, on Contract DA 36-039-sc-15327. 17 Apr 52, 66p. 8 refs. ATI-155 917.

DESCRIPTORS: *Electric insulation, *Organic compounds, *Radiation chemistry, *Resistance (Electrical) X-rays, Gamma rays, Ionization, Polymers, *Styrenes, Butanes, Chlorides, Chloroform, Benzenes, Absorption spectrum, Dosimeters, *Electric bridges, Chemical properties, Physical properties, *Radiation effects, Detectors, Insulating materials.

The Wheatstone Bridge employing an FP-54 electrometer tube and a DC amplifier as the detector has been completed. Reasons for choosing the solvent fractionation method for the separation of styrene and polystyrene are discussed. p-dimethylamino-p'-diazocyanideazobenzene was prepared and was found to posses acid-base indicator properties. Irradiation of iso, sec, and t-butyl chloride demonstrated that these butyl chlorides are also extremely sensitive to breakdown when exposed to ionizing radiation.

PB 163 213 OTS $4.60

Polytechnic Inst. of Brooklyn, N. Y.
HIGH VALUE INSULATORS, by J. Steigman, R. Brill and others. Quarterly progress rept. on 8, 1 Apr-30 June 53, on Contract DA 36-039-sc-15327. 27 July 53, 47p. 3 refs. AD-16 978.

DESCRIPTORS: *Electric insulation, *Organic compounds, *Radiation chemistry, *Resistance (Electrical) *Electric bridges, Xrays, Gamma rays, Ionization, Polymers, *Styrenes, Butanes, Chlorides, *Chloroform, Absorption spectrum, Chemical properties, Physical properties, *Radiation effects, Detectors, Insulating materials.

Resistance measurements on samples of commercial polystyrene sheets were made using the Wheatstone bridge. The apparatus for counting radioactive CO_2 was modified. Polystyrene films, irradiated in air, were shown by IR studies to contain oxygenated irradiation products. Polystyrene powder, irradiated in air and in vacuum, reacted to a greater extent with diphenylpicrylhydrazyl than did unirradiated samples. The sample irradiated in vacuo gave results similar to the air-irradiated sample. The optical density of benzene solutions of chromophore-containing polystyrene varied with time, but the use of methyl isobutyl ketone eliminated this effect. Irradiation of colored polystyrene in air produced marked changes in the absorption characteristics of the polymer. Large x-ray dosage (in air) resulted in complete destruction of the chromophore group. Comparable dosages in vacuo produced little change in the absorption characteristics of colored polystyrene. Thermal degradation of commercial and chromophore-containing polystyrene in air resulted in polymers having absorption spectra similar to commercial and colored polystyrene which had been subjected to extensive x-irradiation. When polystyrene film containing butter yellow was irradiated in air, the butter yellow was destroyed. Colored polymethyl methacrylate was produced by thermally polymerizing methyl methacrylate in the presence of the dye p-dimethylamino-p'-diazocyanideazobenzene. n-butyl chloride was irradiated. IR spectra were taken. (See also PB 163 212) (DDC abstract)

PB 163 214 OTS $6.60

Polytechnic Inst. of Brooklyn, N. Y.
HIGH VALUE INSULATORS, by J. Steigman, R. Brill and others. Final rept. 1 July 51-30 Sep 53, on Contract DA 36-039-sc-15327. 31 Oct 53, 69p. 6 refs. AD-28 234.

DESCRIPTORS: *Electric insulation, *Organic compounds, *Radiation chemistry, *Resistance (Electrical), *Electric bridges, X-rays, Gamma rays, Ionization, Polymers, *Styrenes, Butanes, Chlorides, *Chloroform, Absorption spectrum, Chemical properties, Physical properties, *Radiation effects, Detectors, Insulating materials

Measurements of the resistance of polystyrene and unplasticized polyvinyl chloride were made with a Wheatstone bridge and checked by a capacitance discharge method. A combustion and gas counting technique was superior to the scintillation counting technique for measuring the radioactivity of C^{14} tagged polystyrene. IR spectra of polystyrene irradiated in air revealed the presence of carbonyl groups. The irradiated polystyrene reacted more rapidly with diphenylpicrylhydrazyl than did unirradiated polymer. In irradiation experiments greater destruction of chromophore was obtained with nonaromatic methyl methacrylate polymer than with polystyrene. Butter yellow was only slightly degraded in benzene and cumene, but a much larger breakdown occurred in cyclohexane. Irradiation of butter yellow in polystrene revealed a greater degradation of chromophore than did colored polystyrene. The silver chro-

mate method was satisfactory for measuring small quantities of chloride produced in the irradiation of alkyl chlorides. A free-radical chain mechanism appeared to produce HCl in the irradiation of BuCl. Quantitative measurements showed an initial high rate of chloride production followed by a constant, lower rate for most of the reaction. (DDC abstract) (See also PB 163 213)

Elementary Particles

NASA N63-13045 OTS $3.60

Laboratory for Nuclear Science, Inst. of Tech. Cambridge.
GEOMAGNETICALLY TRAPPED PROTONS WITH ENERGIES GREATER THAN 350 MEV, by Gordon Garmire. Rept. on NASA Contract NASw-37. 1962, 38p. 22 refs.

AD-289 474 OTS $4.60

Maryland U., College Park.
NORMALIZATION CONDITION FOR THE BETHE-SALPETER WAVE FUNCTION AND A FORMAL SOLUTION TO THE BETHE-SALPETER EQUATION, by Iwao Sato. Rept. on Contract AF 49(638)24. June 62, 41p. 9 refs. Dept. of Physics TR/262; AFOSR 2759; NASA N63-16328.

DESCRIPTORS: *Wave characteristics, *Integrals, Particles, Nuclear physics, Elementary particles.

By the use of an inhomogeneous Bethe-Salpeter equation a normalization condition for the Bethe-Salpeter wave function is obtained. This condition requires the normalization integral to be positive. A formal solution is obtained in the ladder approximation, and convergence of the normalization integral is proved by the use of this solution. This solution is also used to prove a dispersion relation for the vertex function of the compound particle, and to give an approximate solution. The positiveness of the normalization integral is proved in the nonrelativistic limit. The bound state of nucleon and antinucleon is studied in the ladder-chain approximation, and it is found that the normalization condition gives finite wave function in spite of divergency of the normalization integral. (Author)

Nuclear Engineering and Power

PB 163 185 OTS $7.60

Alco Products, Inc., Schenectady, N. Y.
SM-2 TRANSIENT VOLTAGE AND FREQUENCY ANALYSIS BY PLANT ANALOG SIMULATION, by J. A. Barrett. Final rept. on Contract DA 44-009-eng-3506. 16 Nov 59, 80p. Rept. no. APAE 53, Volume I; AD-228 682.

DESCRIPTORS: *Nuclear power plants, Transients, Steam power plants, *Generators, Voltage, Frequency, Simulation, *Analog computers, Pressurized water reactors, Power plants (Establishments), Electricity.

A transient analysis of frequency and voltage response of a nuclear fired, pressurized water, steam power plant is presented. The plant is a 7500 kw (electrical) unit. The complete plant analysis is considered. The various sub-system studies are presented as units in the appendix. Stringent voltage and frequency specifications make this analysis necessary. This analysis is accomplished using analog computer techniques. (Author)

BMI-1627 $1.00

Battelle Memorial Inst., Columbus, Ohio.
EFFECT OF HIGH BORON BURNUPS ON B_4C AND ZrB_2 DISPERSIONS IN Al_2O_3 AND ZIRCALOY-2, by Richard J. Burian, Earle O. Fromm, and John E. Gates. Rept on Contract W7405-eng-92. 24 Apr 63, 40p. 8 refs. NASA N63-15969.

NASA N63-13193 OTS $2.00

Lewis [Research Center, National Aeronautics and Space Administration] Cleveland, Ohio.
AN ANALYSIS OF A NUCLEAR POWERED SUPERCRITICAL-WATER CYCLE FOR AIRCRAFT PROPULSION, by Irving M. Karp. 1953, declassified 5 June 62. 76p. 9 refs. Research memo RM E53D29.

NASA N63-13281 OTS $0.50

Lewis [Research Center, National Aeronautics and Space Administration] Cleveland, Ohio.
NONUNIFORM BURNUP AND POISONING EFFECTS IN A REACTOR AND VALIDITY OF UNIFORM APPROXIMATION, by Robert B. Spooner. 9 Mar 53, declassified 5 June 62. 18p. 6 refs. Research memo. RM E53D20.

NASA N62-16976 OTS $10.50

Michigan U. Coll. of Engineering, Ann Arbor.
VOID FRACTION MEASUREMENTS IN A CAVITATING VENTURI, by Willy Smith, Gerald L. Atkinson, and others. Rept. on NASA Grant NsG-39-60. Sep 62, 137p. 12 refs. Rept. no. 03424-7-T.

PB 163 237 OTS $26.00

Computation Lab., Harvard U., Cambridge, Mass.
TABLES OF BLACKBODY RADIATION FUNCTIONS. Problem rept. no. 108, 1 Mar-1 June 58, on Design and Operation of Digital Calculating Machinery, Contract AF 33(616)2717. [1958] 557p. 185 refs. Progress rept. no. AF-51; AD-204 314.

DESCRIPTORS: Digital computers, Computers, Design, Operation, *Blackbody radiation, *Functions, *Tables, Colorimetry, Photometry, Standards.

The functions tabulated in this report describe the radiant and luminous properties of ideal thermal radiators (blackbodies).

NASA N63-13730 OTS $6.60

Massachusetts Inst. of Tech., Cambridge
FIELD MEASUREMENTS OF SOUND PROPAGATION, by S. K. Oleson and U. K. Ingard. Rept. on NASA Contract NASw-6516. 30 Dec 59, 67p. 10 refs.

AD-277 661 OTS $11.00

MRD Div. [General American Transportation Corp.] Niles, Ill.
RADIOGRAPHIC INSTRUMENTATION STUDY, by F. H. Bloedow. Final rept. on Contract AF 29(601)4154. Apr 62, 149p. 3 refs. AFSWC-TDR-62-44.

DESCRIPTORS: *Soils, *Load distribution, *Radiation effects, *Radiographic analysis, Impact shock, Transducers, Blast, Feasibility studies, Underground structures.

Various radiographic techniques are examined and evaluated to determine their feasibility for the study of dynamic soil phenomena. The data, which could be obtained radiographically, are measurements of particle motion and density change as a function of position and time within the soil. The primary advantage of a radiographic system is that the condition of the soil is not modified by transducers within the soil, except for small pellets which have no measurable influence on the dynamic phenomena. Two specific radiographic systems are examined in great detail. They are used to observe dynamic phenomena in soil samples which are subjected to suddenly applied loads. One of these systems uses a steady source of X-rays, and the other system uses a flash X-ray machine. The radiographic records from these tests are presented and analyzed. (Author)

AD-293 205 OTS $6.60

Ohio State U. Research Foundation, Columbus.
INTERACTIONS BETWEEN ELECTROMAGNETIC RADIATION AND MATTER, by L. Carlton Brown. Rept. no. 35 (Final), 1 June 53-31 Mar 62, on Contract AF 18(600)772. 28 Apr 62, 65p. 69 refs. RF Proj. 563; AFOSR 2583.

DESCRIPTORS: *Electromagnetic properties, *Nuclear resonance, Research program administration, Bibliographies, Resonance, Radiation effects

List reports and publications and includes:
The nuclear magnetic resonance spectra of fluorocarbons. Part 1. Halogenated ethanes, pub. in the Jnl. of Molecular Spectroscopy 7:307-321, 1961
Part 2. Halogenated n-paraffins, pub. in the Jnl. of Molecular Spectroscopy 7:322-340, 1961
Part 3. Halogenated propynes, propenes, butenes and cyclopentenes, pub. in the Jnl. of Molecular Spectroscopy 7:385-392, 1961
Part 4. Discussion of chemical shifts and spin coupling constants, pub. in the Jnl. of Molecular Spectroscopy 7:393-398, 1961
Nuclear resonance spectrum of Al^{27} in chrysoberyl, pub. in The Jnl. of Chemical Physics 28:367-372, Mar 58

AD-279 585 OTS $2.60

Rhode Island U., Kingston.
THE PROPAGATION OF RAYLEIGH WAVES PAST A FLUID-LOADED BOUNDARY, by Julius Kane. Scientific rept. no. 1 on Contract AF 19(604)7470. Nov 61, 27p. 8 refs. AFCRL 1052; NASA N62-11030.

DESCRIPTORS: *Mechanical waves, *Propagation, Diffraction, Wave analysis, Geophysics, Oceanographic data, Wave transmission, Geometry.

An important and unexplained feature of Rayleigh wave propagation in the oceans is the absence of first-mode waves in the period range from about 1 to 12 seconds. In this report we solve for the transmission coefficient of a Rayleigh wave propagating past a fluid-loaded boundary, and obtain conditions for which the water bed is either transparent or opaque to Rayleigh wave transmission. Using the standard oceanic parameters, we calculate that the seas reject Rayleigh modes of a period range centered at 3.7 seconds--a figure which is approximately the geometric mean of the bounds of the observed opacity range between 1 and 12 seconds. (Author)

AD-277 608 OTS $2.60

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
INTERACTION OF A PLASMA STREAM WITH THE GEOMAGNETIC FIELDS, by C. M. Tchen. Mar 62, 23p. 13 refs. Technical Information Series R62SD30; NASA N62-13667.

DESCRIPTORS: *Magnetic fields, *Plasma physics, Dipole moments, Fluid flow, Plasma jets.

The interaction between a stream of solar corpuscles and the geomagnetic field represented by a three-dimensional dipole singularity is investigated. An approximate method is developed for estimating the size and shape of the stationary interface between the plasma stream and the magnetic field. The same method is also applied to the corresponding problems in two dimensions, where the magnetic fields are represented by a dipole and a line source. (Author)

Electronics

NASA N63-13590 OTS $7.60

Antennas and Propagation Lab., Utah State U., Logan.
A THEORETICAL AND EXPERIMENTAL INVESTIGATION OF FLUSH MOUNTING CONFIGURATION FOR LOG PERIODIC STRUCTURES, by Clayton Clark, William L. Jones, and others. Rept. on NASA Grant NsG-221-62. 1 Jan 63, 78p. 54 refs.

Includes NASA N63-13591: THE INFLUENCE OF THE CONDUCTING CAVITY UPON THE IMPEDANCE AND RADIATION PROPERTIES OF A LOG PERIODIC ANTENNA-CAVITY ASSEMBLY.

NASA N63-15935 OTS $1.10

Enrico Fermi Inst. for Nuclear Studies, U. of Chicago, Ill.
ON THE QUASI-LINEAR THEORY OF PLASMA OSCILLATIONS IN AN ELECTRIC FIELD, by Peter D. Noerdlinger. Rept. on NASA Grant NsG-96-60. Mar 63, 7p. 6 refs. Rept. no. EFINS-63-16.

NASA N62-16951 OTS $8.10

Geophysics Corp. of America, Bedford, Mass.
A CONVERSION TABLE FOR WAVELENGTHS TO ELECTRON VOLTS, by J. A. R. Samson. Rept. on NASA Contract NASw-124. Apr 61, 84p. 2 refs. GCA-TR-61-5-N; AD-258 658.

AD-284 493 OTS $4.60

Microwave Lab., Stanford U., Calif.
ELECTRONIC INTERACTION THEORY FOR TRANSVERSE-WAVE COUPLERS, by T. Wessel-Berg. Technical note on Contract AF 30(602)2575. July 62, 46p. 10 refs. M.L. rept. no. 922; RADC-TDR-62-387.

DESCRIPTORS: *Wave characteristics, *Waveguide couplers, Electron beams, Electric fields, Circuits, Magnetic fields, Propagation.

This report is concerned with a general theoretical analysis of the interaction between transverse waves propagating on a filamentary electron beam and electromagnetic circuits. The class of circuits considered is that for which the transverse electric and magnetic fields are symmetric with respect to the z-axis. Aside from this restriction on the symmetry properties, the analysis is quite general in the sense that the transverse electric and magnetic field components are arbitrary functions of axial distance. Therefore, the analysis is valid for a variety of circuit configurations, ranging from simple coupler circuits, serving the purpose of coupling rf power in and out of the beam in rf and dc-pumped devices, to transverse traveling-wave tubes and multi-cavity klystrons.

AD-283 995 OTS $2.60

Microwave Lab., Stanford U., Calif.
EXACT SOLUTIONS TO THE EQUATIONS OF SPACE-CHARGE LIMITED FLOW, by Kenneth J. Harker and David S. Colburn. Technical note on Contract AF 30(602)1844. Oct 61, 28p. 8 refs. M. L. rept. no. 858; RADC-TDR-62-83.

DESCRIPTORS: *Partial differential equations, *Numerical analysis, *Electrons, *Fluid flow, *Electron guns, *Space charges, *Equations, Cathodes, Density, Difference equations, Transformations (Mathematics), Vector analysis, Integration.

Most analytical solutions for the electron flow in electron guns have been obtained only for cathodes with highly symmetrical shapes such as cones and spheres. A general method is reported for obtaining by finite numerical processes laminar flow solutions to the space-charge equations. A cathode shape and cathode current density distribution is assumed initially, and from it the flow is determined. The current density and cathode shapes are chosen arbitrarly, subject only to the restriction that they can be written in an analytic form. The general plan is to set up the pertinent partial differential equations, which include in this problem the force equations, the field equations, and the equation of continuity. These equations are then replaced by the corresponding difference equations, and the solution evaluated in a step-by-step manner away from the cathode surface. The calculation is made mathematically stable by an extension of a process of analytic continuation developed recently in connection with the determination of electrode shapes. (Author)

NASA N63-15412 OTS $2.60

Physical Electronics Lab., Space Technology Labs., Redondo Beach, Calif.
IONIZATION ASSOCIATED WITH HYPERVELOCITY IMPACT, by J. F. Friichtenicht and J. C. Slattery. Rept. on NASA Contract NASw-561. 14 Mar 63, 21p. 3 refs. Rept. 8699-6002-RU-000.

NASA N62-17464 OTS $3.60

Plasma Physics Lab., Coll. of William and Mary, Williamsburg, Va.
VHF OSCILLATIONS IN A PENNING GAUGE, by Robert Newman Dennis, Jr. Technical rept. no. 1 on NASA Grant NsG-106-61. July 62, 33p. 18 refs.

NASA N63-13070 OTS $2.60

Plasma Research Lab., Rensselaer Polytechnic Institute, Troy, N. Y.
A 10 KILOGAUSS AIR COOLED MAGNET FOR PLASMA RESEARCH, by J. E. Rudzki and E. H. Holt. Technical rept. no. 6 on NASA Grant NsG-48-60. Jan 63, 24p. 5 refs.

NASA N63-13090 OTS $1.10

Plasma Research Lab., Rensselaer Polytechnic Institute, Troy, N. Y.
A PLASMA WAVEGUIDE CELL FOR AFTERGLOW MEASUREMENTS, by E. H. Holt and K. C. Stotz. Technical rept. no 5 on NASA Grant NsG-48-60. July 62, 10p. 9 refs.

AD-288 014 OTS $3.60

Stanford Electronics Labs., Stanford U., Calif.
INTERACTION BETWEEN A COLD PLASMA (OR DIELECTRIC) AND A CAVITY, by K. I. Thomassen. Rept. on Contract AF 49(638)660. Aug 62, 32p. 5 refs. Technical rept. no. 251-2; SEL-62-092.

DESCRIPTORS: *Cavity resonators, *Plasma physics, *Dielectrics, Dielectric properties, *Impedance matching, Integral transforms, Bessel functions, *Wave guides.

This report treats the interaction between a cylindrical plasma column (or dielectric material) and a resonant cavity through which it protrudes. From the results, one may determine the dielectric constant and loss, or in the case of a plasma, the plasma frequency and collision frequency, given measured values of the resonant frequency shift and change in the cavity Q. This theory differs from the earlier theory of Brown et al in that it treats a cavity of more general shape and takes into account the subtle boundary effects at the openings through which the plasma is admitted. These effects may be calculated by estimating the field variation over the part of the cylindrical plasma surface that lies inside the cavity. (Author)

AD-291 428 OTS $2.60

Stanford Electronics Labs., Stanford U., Calif.
MICROWAVE MODULATION AND DEMODULATION OF LIGHT, by A. E. Siegman, B. J. McMurtry, and S. E. Harris. Rept. on Contract AF 33(616)7944. July 62, 22p. 21 refs. Technical rept. no. 176-2; SEL-62-079.

DESCRIPTORS: *Light, *Modulation, *Detection, Microwave frequency, Phototubes, Traveling wave tubes, Intermediate frequency amplifiers, Oscillators, Lasers.

Rudimentary techniques exist at the present time for optical communications channels with i-f frequencies in the microwave range, up to at least 10 kMc modulation frequencies, although the i-f bandwidth would of necessity be considerably less. It seems entirely reasonable to look for rapid developments in this area, so that i-f passbands of the same order of magnitude should become available in the foreseeable future. Thus, the development of modulation and demodulation equipments appears to be keeping pace with the present intensive developments in the intended carrier facilities, i.e., optical masers. (Author)

AD-275 701 OTS $2.60

Stanford Electronics Labs., Stanford U., Calif.
PROPOSED MICROWAVE PHOTOTUBE FOR DEMODULATING F-M LIGHT SIGNALS, by S. E. Harris and A. E. Siegman. Rept. on Contract AF 33(616)7944. Mar 62, 29p. 3 refs. Technical rept. no. 176-1; SEL-62-031.

DESCRIPTORS: *Instrumentation, *Phototubes, *Lasers, *Microwaves, Frequency modulation, Masers, Oscillation, Light, Signals, Signal-to-noise ratio, Harmonic analysis, Bessel functions, Fourier analysis.

A microwave phototube for demodulating frequency-modulated light signals is proposed. The demodulation is based upon the conversion of the frequency-modulated light into space-modulated light via an optical dispersing element. This space-modulated light is then incident on a photocathode where it is the source of transverse electron-beam waves. A complete spectral analysis of the demodulation process is presented. It is shown that a quasi-steady-state viewpoint, i.e., that of an optical signal with slowly varying frequency, is permissible only if the optical resolution is sufficiently low. Design parameters for a phototube based on the use of a Michelson echelon are presented. A related scheme employing a Fabry-Perot etalon is also discussed. (Author)

Molecular Physics and Spectroscopy

NASA N62-17578 OTS $2.60

Denver U., Colo.
IONIZATION OF NITROGEN AND OXYGEN MOLECULES BY NITROGEN AND OXYGEN MOLECULES, by Nyle G. Utterback. Rept. on NASA Grant NsG-50-60. July 62, 28p. 6 refs.

AD-289 189 OTS $1.60

Hawaii Inst. of Geophysics, Honolulu.
PHOTOIONIZATION AND ULTRAVIOLET ABSORPTION PROCESSES, by K. Watanabe. Final rept., Jan 59-Feb 62, on Contract AF 19(604)4576. Feb 62, 39p. 8 refs. NASA N62-10947.

DESCRIPTORS: *Photochemical reactions, Ionization, *Ultraviolet spectroscopy, Absorption spectrum, Nitrogen, Oxygen, Nitrogen compounds, Oxides, Ethylenes, Chlorides, Butadienes, Ionization potential, Photons, *Upper atmosphere, Nickel, Silver, Indium, Gold, Tantalum, Copper compounds, Silver compounds, Lead compounds, Iodides, Emissivity, *Photoelectric effect.

Photoelectric photometry with improved resolution (0.1 to 0.2A) was extended to the region 840-1100 A. Absorption cross sections of O_2 and N_2 were measured at several hundred wavelengths in this region using different pressures and cell lengths. Photoionization yields of the following gases were measured in the region from 1050 to 1500 A: COS, CS_2, methyl chloride, methyl bromide, methyl iodide, ethyl chloride, ethyl bromide, ethyl iodide, methyl formate, ethyl formate, benzene, benzenethiol, mesitylene, acetone, and 1,3-butadiene. Photoelectric emission from about twenty metals, several semiconductors, and a few compounds, were studied in the spectral region 850-3000 A.

NASA N62-17065 OTS $2.60

Naval Research Lab., Washington, D. C.
A PULSED LIGHT SOURCE FOR THE EXTREME ULTRAVIOLET, by W. R. Hunter, Rept. on NASA Order R-21. June 62, 29p. 15 refs.

AD-269 097 OTS $2.60

Physical Studies, Inc., Centerville, Ohio.
DIPOLE MOMENT INDUCTION IN HOMONUCLEAR DIATOMIC MOLECULES. I. THE ON-AXIS CASE, by R. G. Breene, Jr. Technical rept. no. 1 on Contract AF 19(604)8417. Nov 61, 30p. 3 refs.

DESCRIPTORS: *Quantum mechanics, Molecular structure, Oxygen, Molecules, *Dipole moments, Atoms, *Atomic orbitals, Infrared spectroscopy, Partial differential equations, Perturbation theory, Functions, Integrals, Integration, Matrix algebra.

The distortion of the electronic wave function of a homonuclear diatomic molecule is considered for that case where the perturbing atom or molecule is on the molecular symmetry axis. A wave function particularly applicable to the physical situation is developed, and this wave function is specifically determined for diatomic oxygen as an example. The electric dipole moment thus induced in oxygen is then computed as a function of perturber separation. (Author)

AD-292 754 OTS $1.60

Royal Holloway Coll., U. of London, Englefield Green Surrey (Gt. Brit.)
VERY LOW-FREQUENCY INFRA-RED SPECTROSCOPY by Arthur Finch and P. J. Hendra. Annual technical status rept. no. 1, 1 Oct 61-1 Oct 62, on Contract N 62558-3030. [1962] 18p. 16 refs.

DESCRIPTORS: *Spectrophotometers, Very low frequency, *Infrared spectroscopy, Infrared optical systems, Infrared detectors, Diffraction gratings, Optical filters, Optical images, Reflectors, Prisms (Optics), Design, Mirrors, Tests, Power supplies, Infrared optical materials, Infrared equipment, Test equipment, Crystal filters.

The design and construction of a low frequency infrared spectrometer are described. Preliminary performance figures for the instrument are given. (Author)

Optics

PB 163 190 OTS $13.00

Physical Research Labs., Boston U., Mass.
SELECTED TOPICS IN OPTICS AND COMMUNICATION THEORY, by Edward L. O'Neill. Rept. on Contract AF 33(616)3405. Oct 57, 188p. 72 refs. Technical note no. 133; AD-155 143.

DESCRIPTORS: *Optics, *Communication theory, Optical systems, Linear systems, Optical filters, Filters (Electromagnetic) Diffraction, Scanning, Optical images, Sampling, Statistical functions.

Attention is first focused on linear electrical systems as filtering devices, with emphasis on the convenience and suitability of employing Fourier techniques. Consideration is then given to the purely geometric aspects of image formation, with emphasis on the description of an optical system as a two-dimensional spatial frequency filter. Much of the remaning text takes into account the effects of amplitude and/or phase variations (aberrations) on the spatial frequency response of diffraction-limited systems. In order to deal with random variations, the concepts of correlation and spectral density functions are then treated. Some space is devoted to the possibility of synthesis in optics. The notes conclude with a discussion of quality criteria for image forming systems and with a brief resume of the current state of the art. (Author)

AD-288 015 OTS $1.60

Stanford Electronics Labs., Stanford U., Calif.
PHOTOCONDUCTIVE MIXING EXPERIMENTS USING A RUBY LASER AND A SEMICONDUCTOR MICROWAVE PHOTODIODE, by H. Inaba and A. E. Siegman. Rept. on Contract DA 36-039-sc-85387. June 62, 15p. 3 refs. Technical rept. no. 177-2; SEL-62-075.

DESCRIPTORS: *Lasers, *Photoelectric materials, *Crystal mixers, *Light communication systems, *Diodes (Semiconductor), *Ruby, Low temperature research, Ultrahigh frequency, Gallium compounds, Gold compounds, *Microwave equipment, S-band, X-band, Detectors, Semiconductors.

This report describes the operation of semiconductor microwave photodiode (PIN-junction photodiode) as an optical-frequency mixer to produce microwave photobeats from the light output of a ruby optical maser. The output spectrum of the optical maser consists of simultaneous, discrete, axial optical-mode components separated by a frequency interval corresponding to a microwave frequency. With a PIN-junction photodiode, the detection of microwave beats produced by photoconductive mixing between these components has been made with high signal-to-noise ratio. These heterodyned signals range from uhf through X-band, corresponding to photo-beats between the first through sixteenth mode intervals in a ruby laser rod. The PIN-junction photodiode appears promising for the realization of communication systems employing microwave-modulated light from optical masers. This diode serves as a photomixer that is compact, simple, capable of fairly wide frequency range (when re-tuned at each frequency), and possessed of good infrared response. (Author)

Solid State Physics

AD-289 122 OTS $2.60

Arizona U., Tucson.
TECHNIQUES FOR QUENCHING POINT DEFECTS IN METAL WIRES, by R. M. Emrick. Technical rept. on Contract AF 49(638)790. [1962] 21p. 10 refs. AFOSR 2581; NASA N62-17470.

DESCRIPTORS: Metals, *Wire, Heat treatment, *Crystal lattice defects, Quenching (Inhibition), Stresses, Theory, Fluids, Test methods.

The purpose of this paper is to outline some of the techniques which have been developed in recent years. These techniques, for the greatest part, have not been developed by the author. (Author)

AD-277 121 OTS $9.60

Electrical Engineering Research Lab., U. of Illinois, Urbana.
A MICROWAVE TECHNIQUE FOR THE STUDY OF DEVIATIONS FROM OHM'S LAW IN HIGH RESISTIVITY SEMICONDUCTORS, by Kenneth Rose. Technical rept. no. 1 on Contract DA 36-039-sc-78313 and Technical rept. no. 4 on Contract AF 49(638)417. 1 June 62, 116p. 69 refs. AFOSR-277.

DESCRIPTORS: *Semiconductors, *Resistance, Measurement, Microwaves, Solid state physics, Electrons, Electric fields, Theses.

The development of a microwave technique for the study of deviations from Ohm's law in high resistivity semiconductors is presented in this report. In this technique a high level microwave field is used to produce the deviations as well as measure them. A semiconductor sample is placed in a resonant cavity and the conductivity of the sample is inferred from measurements of transmission through the cavity. Preliminary measurements on samples of high resistivity silicon at temperatures down to the boiling point of liquid nitrogen are reported. The results of these measurements indicate that the technique in its present form is applicable to semiconductors with resistivities up to 600 ohm-cm. (Author)

AD-281 678 OTS $1.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
SOLID STATE. Quarterly progress rept., 1 Jan-31 Mar 62, on Contract AF 19(604)7400. 15 Apr 62, 11p.

DESCRIPTORS: *Solid state physics, Bibliographies, *Semiconductor devices, Design, *Crystals, Chemistry, *Materials, *Intermetallic compounds, *Quantum mechanics, Atomic energy levels, *Microwaves, *Magnetism, Solids, Magnetic properties.

Contents:
Solid state device design
Chemistry
Materials research
Band structure of solids
Microwave and magnetic properties of solids
(See also AD-270 511)

AD-284 057 OTS $1.60

Pennsylvania U. School of Metallurgical Engineering, Philadelphia.
ON THE FORMATION OF $D8_8$ - PHASES BETWEEN IV GROUP TRANSITION METALS AND ALUMINUM, GALLIUM, INDIUM AND ANTIMONY, by H. Boller and E. Parthe', Technical status rept. no. 4, 1 Jan-31 Sep 62, on Crystal Chemistry of Metallic Compounds, Contract AF 49(638)1027. Sep 62, 12p. 9 refs. AFOSR 2646.

DESCRIPTORS: *Group IV elements, *Titanium compounds, *Zirconium compounds, *Hafnium compounds, *Aluminum compounds, *Gallium compounds, *Antimonides, *Indium, Synthesis (Chemistry), *Crystal structure, Transition elements, *Metallic compounds, Intermetallic compounds, *Phase studies.

A search for the occurrence of compounds with $D8_8$ structure has resulted in the discovery of three new members: Ti_5Ga_3: a = 7.604Å, c = 5.288Å and c/a = 0.695; Hf_5Ga_3: a = 7.962Å, c = 5.677Å and c/a = 0.713; Zr_5Sb_3: a = 8.465Å, c = 5.806Å and c/a = 0.686. The free parameter for Hf_5Ga_3 and Zr_5Sb_3 have been found to be $x_{Me} = 0.25$ and $x_X = 0.610$, while the free parameters for Ti_5Ga_3 are slightly different with $x_{Ti} = 0.24$ and $x_{Ga} = 0.605$. The formation of the $D8_8$ - phases between IV group transition metals and aluminum, gallium, indium and antimony is discussed. (Author)

AD-284 058 OTS $1.60

Pennsylvania U. School of Metallurgical Engineering, Philadelphia.
ON THE POSSIBILITY OF FORMING PSEUDO SILICIDES, by H. Boller and E. Parthe'. Technical status rept. no. 5, 1 Jan-31 Sep 62, on Crystal Chemistry of Metallic Compounds, Contract AF 49(638)1027. Sep 62, 13p. 7 refs. AFOSR 2647; NASA N62-16807.

DESCRIPTORS: *Hafnium compounds, *Indium compounds, *Niobium compounds, *Gallium compounds, *Zirconium compounds, *Aluminum compounds, *Titanium compounds, *Antimonides, *Phosphides, *Molybdenum compounds, Crystals, *Crystal structure, *Metallic compounds, Intermetallic compounds, *Silicides, *Phase studies.

The concept of pseudosilicon is very successful for the prediction of occurrence and structure of certain groups of nonmetallic compounds. Experiments to extend this concept to metallic compounds show that the concept has to be modified here. The extremely narrow homogeneity range observed in compounds composed as pseudosilicon or nonmetallic pseudosilicon oxide is replaced here by wide ranges which may extend far from the ideal composition of the pseudosilicide. Close to the composition of the pseudosilicide, a chemical stabilization and a volume contraction may be observed. Two new true pseudosilicides have been synthesized: $Hf_5(In_{0.5}Sb_{0.5})_3$ with $D8_8$ structure; and $Mo(Al, P)_2$ with C40 structure.

AD-284 060 OTS $2.60

Pennsylvania U. School of Metallurgical Engineering, Philadelphia.
THE STRUCTURE OF NbAs AND OF SIMILAR MONOPHOSPHIDES AND ARSENIDES OF NIOBIUM AND TANTALUM, by H. Boller and E. Parthe', Technical status rept. no. 3, 1 Jan-31 Sep 62, on Crystal Chemistry of Metallic Compounds, Contract AF 49(638)1027. Sep 62, 24p. 7 refs. AFOSR 2645.

DESCRIPTORS: *Niobium compounds, *Tantalium compounds, *Arsenides, *Phosphides, Transition elements, *Metallic compounds, Synthesis (Chemistry), *Crystal structure, Lattices, *Crystal lattice defects.

The structure of NbAs has been solved and has been found to present a new structure type, which is a transposition structure variation of the WC structure type. NbAs is tetragonal with a = 3.452Å and c = 11.679Å. Space group is C_{4V}^{11} - $I4_1md$ with

4Nb in 4a (with z = 0 and 4As in 4a) with z = $\frac{5}{12}$. The same structure type has been found to apply to TaAs with a = 3.437Å and c = 11.65$_6$Å and "β -NbP" with a = 3.334Å and c = 11.37$_8$Å. The previously reported structure proposal for α and β -NbP was proven to be wrong. In the case of a gradual P deficiency, a gradual structural change of the NbAs structure type was observed, which corresponds to a gradual irregular transposition, presenting a structure halfway between NbAs and WC. The new structure type and its variation fit well with the other known monophosphide or arsenide structure types. (Author)

AD-289 483 OTS $2.60

Rochester U., N. Y.
COOPERATIVE OPTICAL ABSORPTION IN SOLIDS, by D. L. Dexter. Rept. no, 9 on Contract AF 49(638)432. Jan 62, 22p. 9 refs. AFOSR 2271, NASA N62-10883.

DESCRIPTORS: *Optics, *Solids, *Photons, Absorption, Resonance, Ions, Atomic energy, Levels, Electrons, Excitation, *Quantum mechanics, Electric moments.

A discussion is given of a mechanism for resonance energy transfer in the absorption of light by a pair of neighboring ions in a crystal, as recently demonstrated by Varsanyi and Dieke. An estimate of the probability for this process is given. (Author)

AD-289 184 OTS $1.60

Rochester U., N. Y.
THEORETICAL INVESTIGATIONS OF THE EFFECTS OF IMPERFECTIONS ON THE OPTICAL PROPERTIES OF SOLIDS, by D. L. Dexter. Final rept. on Contract AF 49(638)432, continuation of Contract AF 18(600)688, and Grant AF-AFOSR-62-145. Feb 62, 14p. 34 refs. AFOSR 2247; NASA N62-10882.

DESCRIPTORS: *Optics, *Solids, Electrical properties, *Optical properties, *Crystal lattice defects, Theory, Reports, Abstracts, *Bibliographies.

Summarizes reports and publications.

PB 163 191 OTS $6.60

Union Thermoelectric Div., Comptometer Corp. [Niles] Ill.
MILITARY QUARTZ CRYSTAL UNITS (CR-18/U, 4 TO 16 MC). Semiannual rept., 1 July 57-28 Feb 58, on Contract DA 36-039-sc-71061. [1958] 68p AD-161 352.

DESCRIPTORS: *Quartz crystals, *Quartz resonators, Crystals, Crystal holders, Very high frequency, Military requirements, *Harmonic oscillators, Crystal oscillators, Production, *Manufacturing methods, Processing, Design, Surfaces, Frequency, Temperature, *Crystal units.

Contents:
Design Data for CR-18/U
Survey of Requirements for Crystal Units for Jet and Missile Applications
Study of Solders and/or Cements for Bonding
Pressure-welded Aluminum Holder
Inner-peripheral Saw
Support of the Bulova Mechanization Program
Production of 108 mc Crystal Units

Theoretical Physics

AD-289 186 OTS $8.60

Maryland U., College Park.
RELATIVISTIC QUANTUM MECHANICS AND QUANTUM FIELD THEORY, VOLUME II, by J. Sucher and R. Fong. Rept. on Contract AF 49(638)24. Mar 62, 99p. 3 refs. Dept. of Physics Technical rept. no. 249; AFOSR 2477; NASA N62-12066.

DESCRIPTORS: *Quantum mechanics, *Partial differential equations, Scattering, Operators (Mathematics), *Field theory.

Contents:
Interacting Fields: Quantum Electrodynamics
A. Introduction to Quantum Electrodynamics
1. Interacting Dirac and Maxwell Fields
2. Structure of H_1: Fundamental Virtual Processes in Q. E. D.
3. Classification of Processes of Pure Q. E. D.
4. Old-fashioned Q. E. D.: Time-ordered Diagrams
5. The Rules for the Construction of the Contribution to T_{ba} from a Time-ordered Diagram
6. Rules for the Construction of the Contribution to S_{ba} from a Feynman Diagram
B. Proof of the Feynman Rules
1. Propagation Functions for Scalar and Spinor Fields
2. The Theorems of Wick
3. Feynman Diagrams.

AD-275 907 OTS $2.60

Maryland U., College Park.
HEISENBERG FIELDS WHICH VANISH ON DOMAINS OF MOMENTUM SPACES, by O. W. Greenberg. Rept. on Contract AF 49(638)24. Apr 62, 27p. 17 refs. Technical rept. no. 251; AFOSR-2500.

DESCRIPTORS: *Quantum mechanics, Particles, *Wave analysis, Equations, Fourier analysis, Integral transforms, Transformations (Mathematics), Space environmental conditions, Polynomials, Relativity theory, Field theory.

If a local Heisenberg field vanishes, or, where appropriate, has an infinite zero, on one of the momentum space domains, then the field is a generalized free field. Counter examples show that this conclusion cannot be drawn if the field vanishes on the momentum space domains. It follows that if two fields in the same Borchers class are equal on one of the domains, then the fields differ at most by a generalized free field in their Borchers class. (Author)

NASA N62-17418 OTS $1.60

Theoretical Chemistry Inst., U. of Wisconsin, Madison.
THE VIRIAL THEOREM AND ITS GENERALIZATIONS IN SCATTERING THEORY, by Peter D. Robinson and Joseph O. Hirschfelder. Rept. on NASA Grant NsG-275-62(4180). 13 Aug 62, 17p. refs. Rept. no. WIS-NASA-1.

NASA N62-17419 OTS $1.10

Theoretical Chemistry Inst., U. of Wisconsin, Madison.
HYPERVIRIAL THEOREMS FOR VARIATIONAL WAVE FUNCTIONS IN SCATTERING THEORY, by Saul T. Epstein and Peter D. Robinson. Rept. on NASA Grant NsG-275-62(4180). 7 Sep 62, 9p. refs. Rept. no. WIS-NASA-2.

Thermodynamics

PB 163 218 OTS $2.60

Applied Physics Lab., Johns Hopkins U., Silver Spring, Md.
THE INTERMITTENT THERMOMETER: A NEW TECHNIQUE FOR THE MEASUREMENT OF EXTREME TEMPERATURES, by S. D. Raezer and H. L. Olsen. Rept. on Contract NOrd-7386. Dec 60, 21p. 3 refs. Rept. no. CM-985; AD-252 682.

DESCRIPTORS: *Thermocouples, *Melting, *Plasma physics, Temperature sensitive elements, Gases.

A new technique is described by which the range of a thermocouple may be extended above its melting point. Its primary use is the measurement of the temperature of very hot flowing gases or plasmas. The device consists essentially of a thermocouple probe that is shuttled back and forth between a point in the gas stream and a water-cooled jacket. The thermocouple is cycled using two different cycling ratios of time spent in the hot gas to time spent in the jacket, in each case reaching an average equilibrium temperature that depends upon the gas temperature and the cycling ratio. Temperatures measured with this device are found to be in good agreement with those obtained by ordinary means in the range where material thermometric devices may be used. Temperatures were measured up to 3500 K, using a chromel-alumel thermocouple. The maximum temperature that can be measured is determined by the natural response time of the probe. (Author)

NASA N63-13958 OTS $6.60

General Electric Co., Cincinnati, Ohio.
ALKALI METALS BOILING AND CONDENSING INVESTIGATIONS. Quarterly rept. no. 1, 1 July-30 Sep 62, on NASA Contract NAS3-2528. 1962, 70p. 15 refs. NP-12433.

PB 163 171 OTS $5.60

Stanford U., Calif.
HEAT TRANSFER FROM ROTATING BODIES. PART I. THE HORIZONTAL CYLINDER IN AN INFINITE ENVIRONMENT, by W. M. Kays and I. S. Bjorklund. Technical rept. no. 27 on Contract N6onr-251, T. O. 6. 11 Oct 55, 55p. 24 refs. AD-78 116.

DESCRIPTORS: *Heat transfer, Rotation, Cylindrical bodies, Fluids, Thermal conductivity, Temperature, Distribution, Convection, Test equipment, Tests, Design, Measurement, Thermodynamics, Bodies of revolution, Fluid flow.

Results are presented for an investigation of heat transfer from or to rotating surfaces surrounded by fluids and heat transfer between rotating surfaces separated by fluids. The geometry considered is that of a rotating cylinder in an infinite environment. A test apparatus which is described for rotating cylinders incorporates a temperature-measurement system which avoids the usual problem of bringing the signal out through slip rings and brushes. No discrepancies were found which were attributed to deficiencies in the temperature-measurement system. (DDC abstract)

RESEARCH METHODS, TECHNIQUES AND EQUIPMENT

PB 163 216 OTS $2.60

Research Lab. of Electronics, Mass. Inst. of Tech., Cambridge.
COMMUNICATION IN THE PRESENCE OF ADDITIVE GAUSSIAN NOISE, by F. A. Muller. [Rept. on Contract DA 36-039-sc-100]. 27 May 53, 21p. 12 refs. Technical rept. no. 244; AD-33 859.

DESCRIPTORS: *Communication theory, Communication systems, Noise, Statistical analysis, Probability.

Communication systems are discussed in which the symbols to be transmitted are represented by signal functions which are (1) limited to consecutive intervals in time and (2) disturbed by the addition of correlated Gaussian noise. The problem is that of computing a posteriori probabilities of transmitted symbols when the received signal and the a priori probabilities are known. The condition is imposed that the procedure of computing a posteriori probabilities for the symboi transmitted in a particular interval is independent of the choice of all other symbols in a sequence. The detection procedure is restricted so that only the signal plus the noise received in its own interval is used. (DDC abstract)

SOCIAL SCIENCES

Documentation

PB 181 515 OTS $2.75

Herner and Co., Washington, D. C.
FUNCTIONAL SYMBOLS CURRENTLY IN USE IN GOVERNMENT REPORTS, by Paul R. Mahany, William A. Creager, and Saul Herner. Final rept. on Contract NSF-213. Dec 62, 123p.

DESCRIPTORS: *Documentation, *Reports, Standardization, *Dictionaries

This study was undertaken (1) to collect and define a wide selection of Government research and development report categories, and (2) to uncover areas of common usage as a basis for standardizing report designations, particularly with respect to indicators of function. A dictionary of definitions applied by 71 agencies to 245 separate report series forms the core of this report. This dictionary, together with supporting tables, substantially satisfies the first intention.

PB 181 516 OTS $1.50

Science Communication, Inc., Washington, D. C.
A GUIDE TO ANTARCTIC INFORMATION SOURCES. Rept. on Survey of the Informational Resources and Requirements of the Antarctic Community, Contract NSF C-214. 1 Feb 62, 52p. 12 refs.

DESCRIPTORS: *Antarctic regions, *Scientific research, Science, Libraries, Communication theory, *Directories, Subject indexing.

Contents:
Topic finder list
Directory of institutions.

MISCELLANEOUS

PB 181 415 OTS $1.25, $10/year

Naval Research Lab., Washington, D. C.
REPORT OF NRL PROGRESS. July 63.

DESCRIPTORS: *Naval research, *Scientific research, *Atmosphere, Radioactive fallout, Aerosols, Weather stations, Telemeter systems, *Chemistry, Fuels, Aerosol generators, *Mechanics, Accelerometers, Ultrasonic radiation, Hypervelocity guns, *Metallurgy, Steel, Stainless steel, Fractography, Nickel alloys, Palladium alloys, Pressure vessels, Titanium, *Nuclear physics, Linear accelerators, Electron beams, *Optics, Lasers, *Radio, Radio stations, Very low frequency, Programming (Computers), Switching circuits, Ionosphere, Electron density, Moon, Radio transmitters, Voltage regulators, Diodes (Semiconductor), *Acoustics, Depth indicators, Metal films, Reports, Patents

Contents:
Articles:
Address of Welcome to NRL's Fortieth Anniversary Celebration, by B. F. Bennett
Principal Address at NRL's Fortieth Anniversary Celebration, by Hon. James H. Wakelin, Jr.
Reminiscences, by R. M. Page
NRL from 1923 to 1963, by Staff Written
Scientific Program:
Atmosphere and Astrophysics: Preliminary report on the filter-pack technique for classifying radioactive aerosols by particle size. Design and modifications of automatic weather station (Grasshopper) between 1955 and 1961. Problems involved in large environmental telemetering system
Chemistry: Effect of fuel viscosity and related factors on the filterability of distillate fuels. Studies of portable air-operated aerosol generators
Mechanics: Performance of accelerometer transducers for shock and vibration measurements. Effect of stress on the velocity of ultrasonic waves. Computer analysis of light-gas hypervelocity gun.
Metallurgy and Ceramics: Microtopography of the fracture surface of a low-alloy steel (4340). Electron fractographic study of matching fracture surfaces in 410 stainless steel. The d-band of nickel-palladium alloys. "Growth momentum" measurements in supercooled bismuth. Neutron embrittlement of the SL-1 reactor pressure vessel. Mechanical properties of titanium and titanium alloys
Nuclear and Atomic Physics: NRL LINAC, with only one klystron connected, yields first test beam with an energy of about 11 Mev and a current of about 1/4 microampere. Progress on the design and construction of the Sozotron for intense electron beam storage
Optics: Optical absorption processes in the ruby laser
Radio: Modular additive decimal codes for n-valued (n = 2 to n = 9) logic switching systems. Field strength measurements of vlf transmissions from U.S. Navy radio station NPG. High-frequency lunar reflection circuit used to study ionospheric electron density. Control of output voltage phase of multiple transmitters. Synthesis of unity-gain complex zero RC networks. Gallium arsenide diode injection laser fabricated from single crystal material
Sound: Analysis of precision depth recorder traces for all ship speeds
Supporting Techniques: Monitoring the Transmission and Reflection of Metallic Films

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